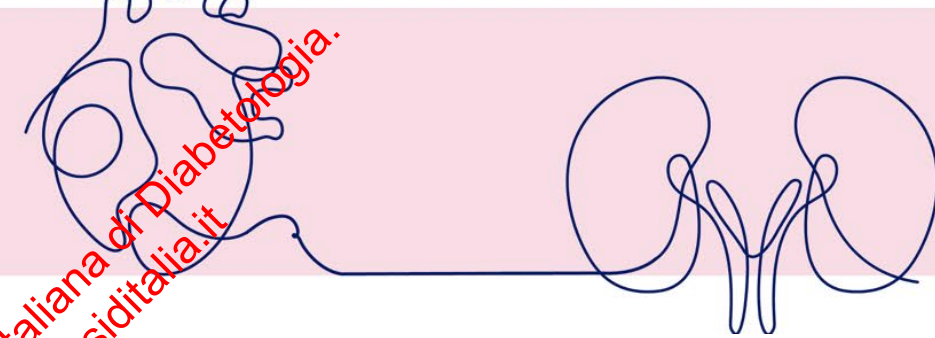


Diagnosi precoce e
trattamento efficace
della patologia

**CARDIONEFRO
METABOLICA**



Napoli
Ramada by Wyndham Naples
21 • 22 novembre 2025



Diagnosi precoce e
trattamento efficace
della patologia

**CARDIONEFRO
METABOLICA**



Diagnosi precoce e trattamento efficace della patologia cardionefrometabolica: dalla teoria alla pratica

Napoli, 21/22 novembre 2025

RISCHIO CARDIONEFROMETABOLICO NEL DIABETE TIPO 2

Il circolo vizioso della disfunzione ventricolare nel diabete mellito

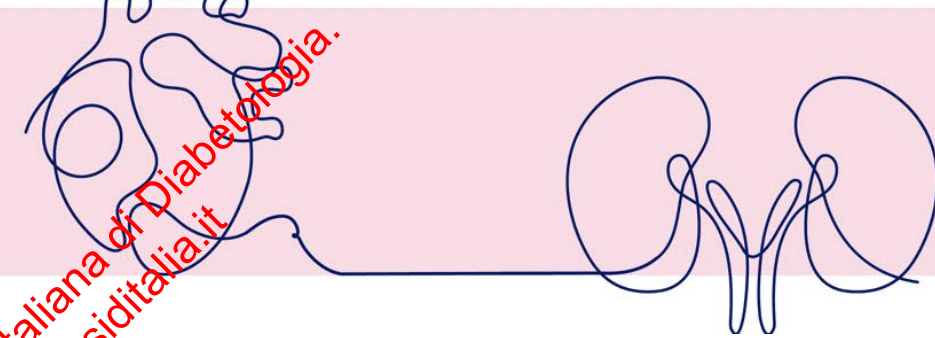
Massimo Iacoviello (Bari)

Diapositiva preparata da MASSIMO IACOVIELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it

Ai sensi dell'art. 4.5 su "Docenti e moderatori dell'evento" pag. 8 del Manuale Nazionale di Accreditemento per l'erogazione di eventi ECM del 06/12/2018, dichiaro che negli ultimi 2 anni ho avuto rapporti diretti di finanziamento con i seguenti soggetti portatori di interessi commerciali in campo sanitario:

- Fee for consultancy services and Advisory Board: Novo Nordisk, Eli Lilly, Boehringer Ingelheim
- Speaker fees: Astra, Boehringer Ingelheim, Eli Lilly, Bruno, Novartis, Novo Nordisk

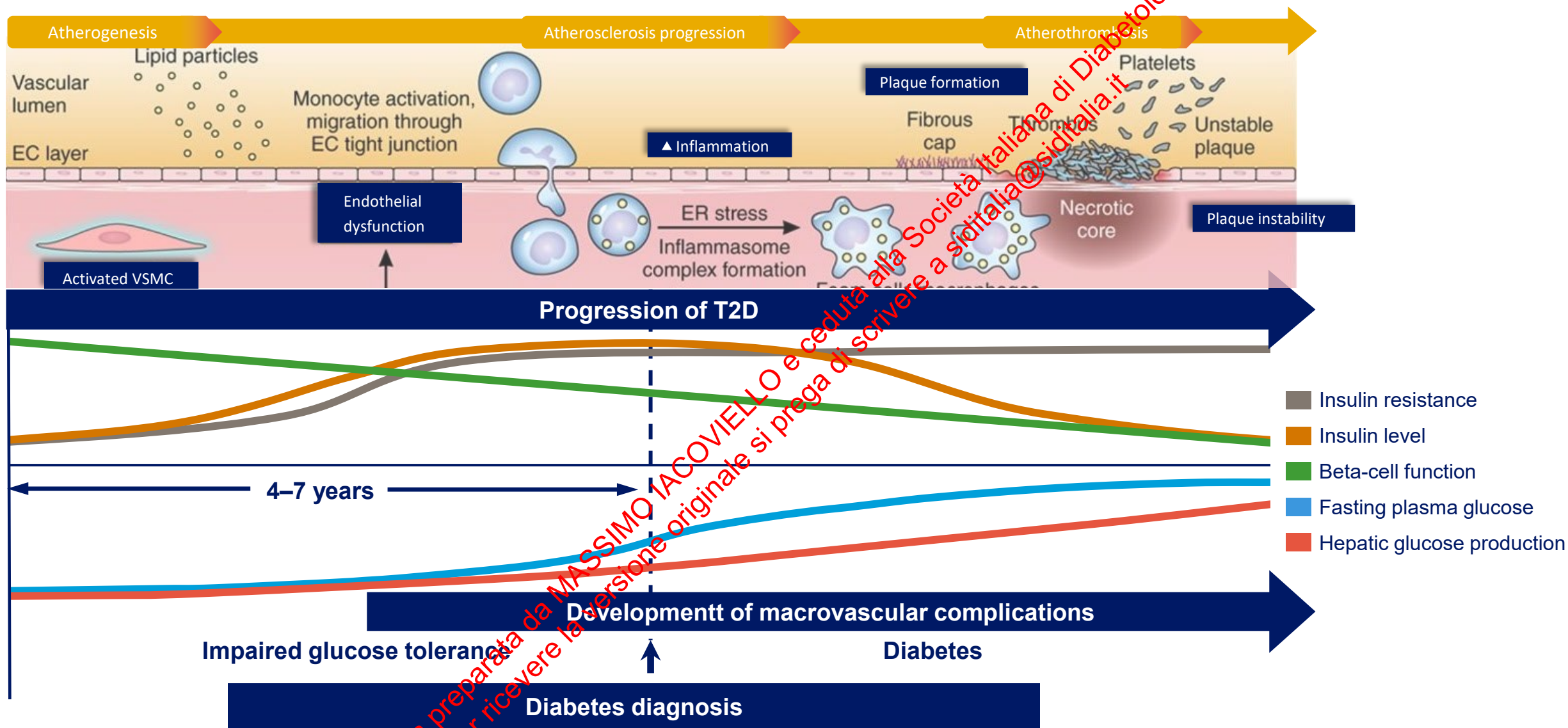
Diapositiva preparata da MASSIMO IACOVIELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it.



Agenda

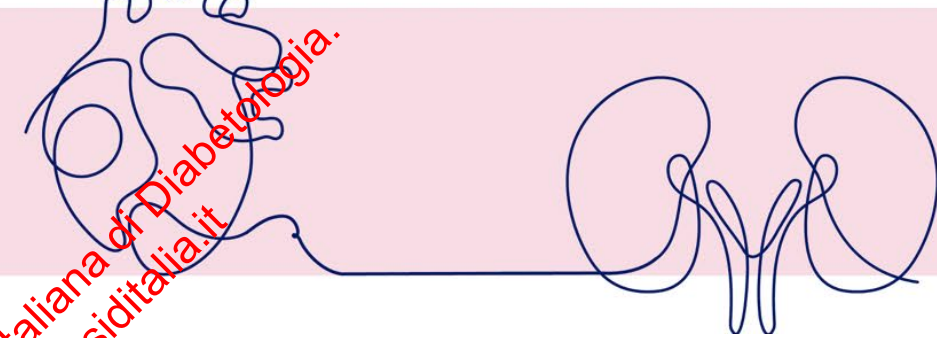
- **Diabete e scompenso cardiaco: il rischio cardiovascolare non percepito**
- Diabete e disfunzione sisto-diastolica: il background fisiopatologico
- Il ruolo di obesità e CKD
- Diabete e scompenso cardiaco: una relazione biunivoca
- La diagnosi precoce di scompenso cardiaco

Diapositiva preparata da MASSIMO IACOVELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it



Low Wang et al, *Circulation*, 2016;133:2459–2502

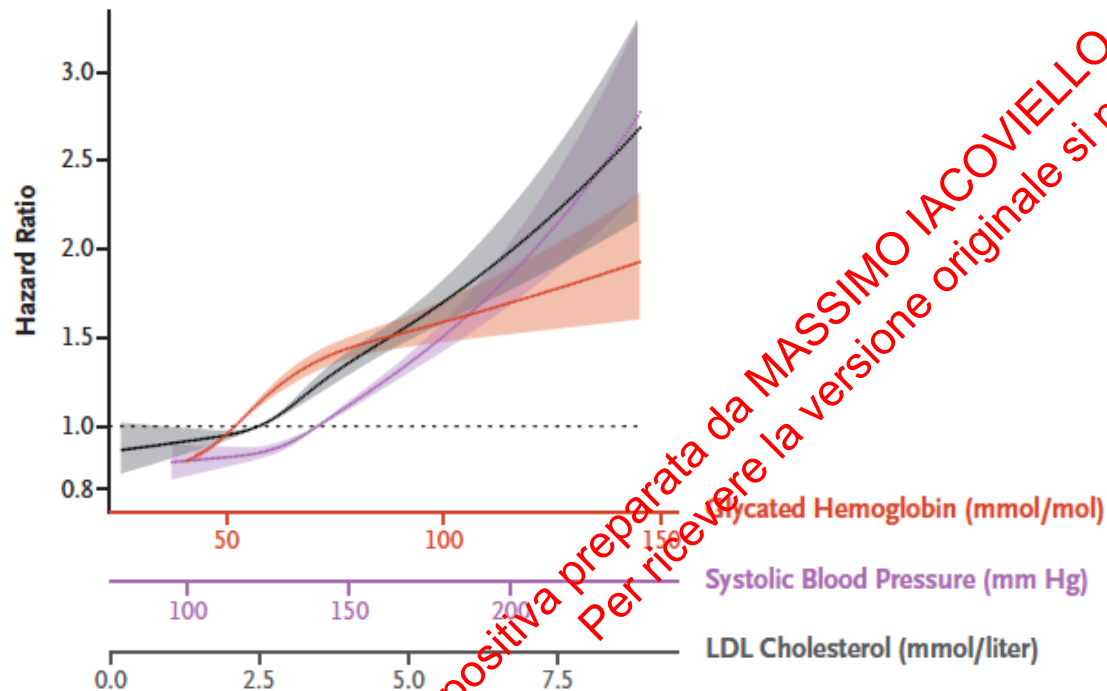
Adapted from Kendall DM et al, *Am J Med*, 2009;122(6 Suppl):S37–S50



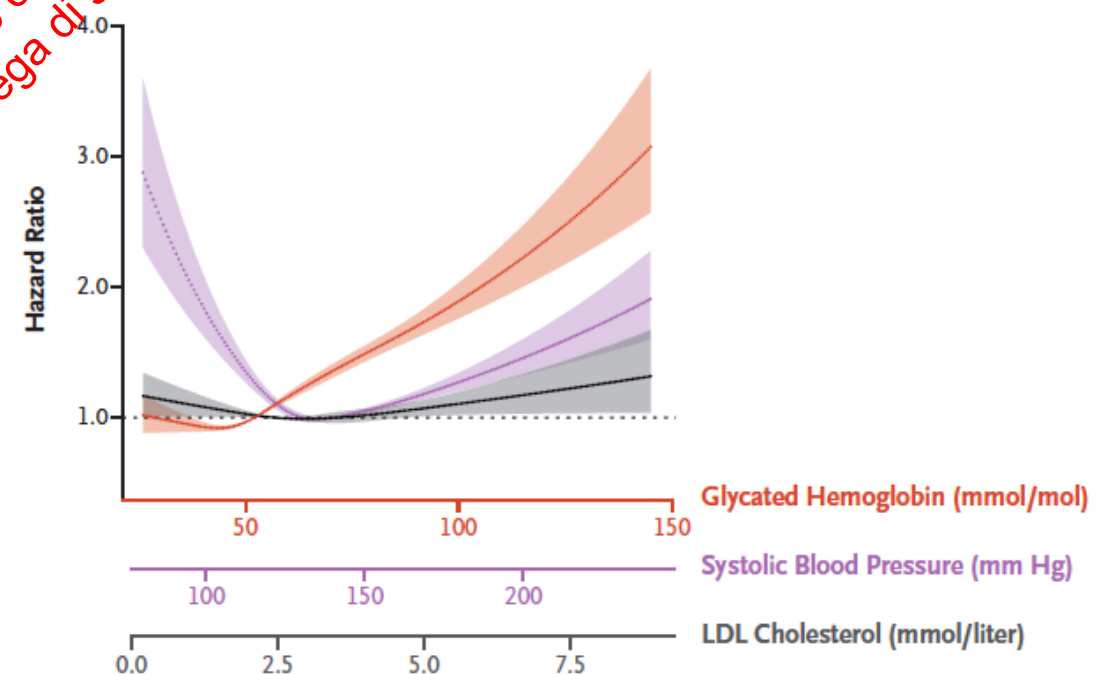
Continuum cardiovascolare: Diabete e Scompenso Cardiaco

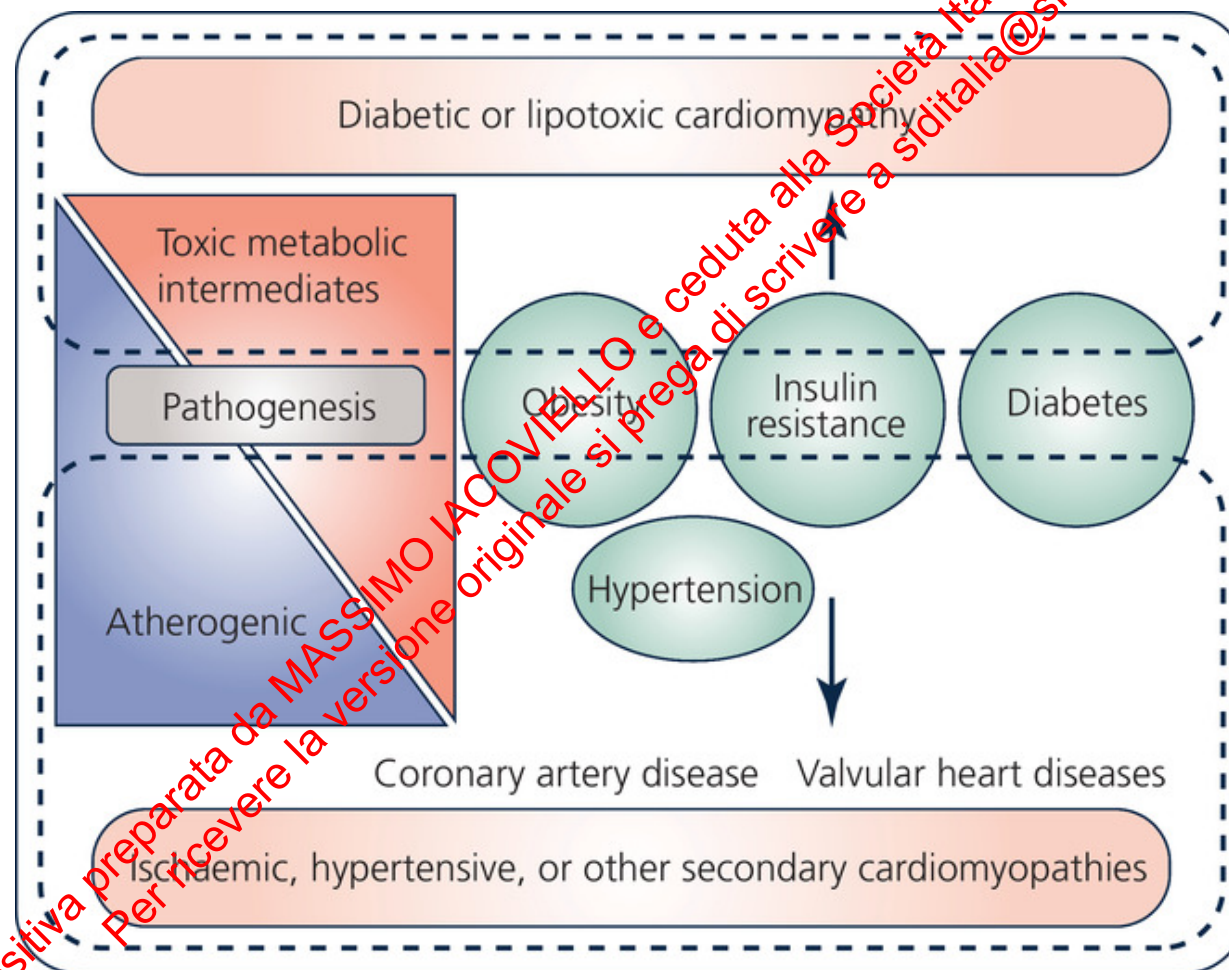
Swedish National Diabetes Register: 271,174 T2DM matched with 1,355,870 controls

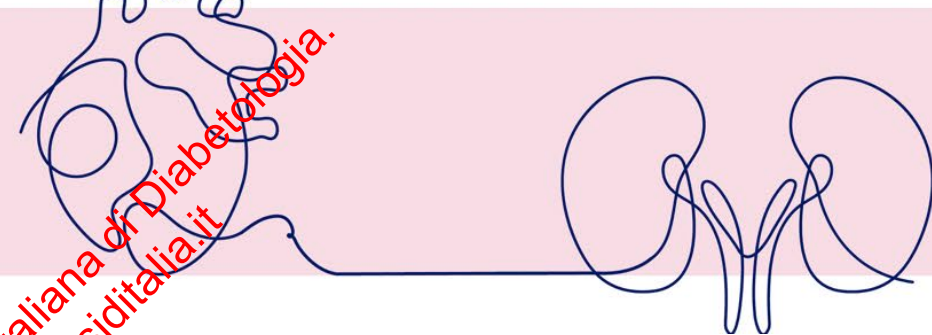
B Acute Myocardial Infarction



C Heart Failure



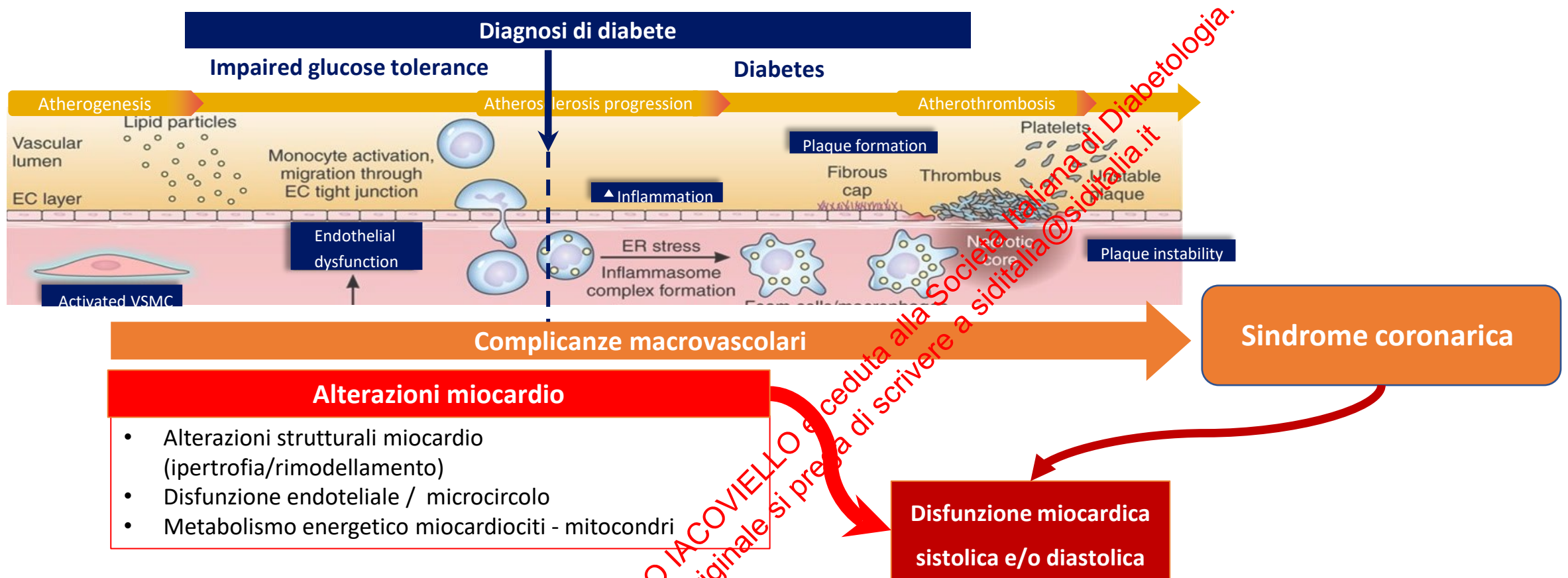




Agenda

- Diabete e scompenso cardiaco: il rischio cardiovascolare non percepito
- **Diabete e disfunzione sisto-diastolica: il background fisiopatologico**
- Il ruolo di obesità e CKD
- Diabete e scompenso cardiaco: una relazione biunivoca
- La diagnosi precoce di scompenso cardiaco

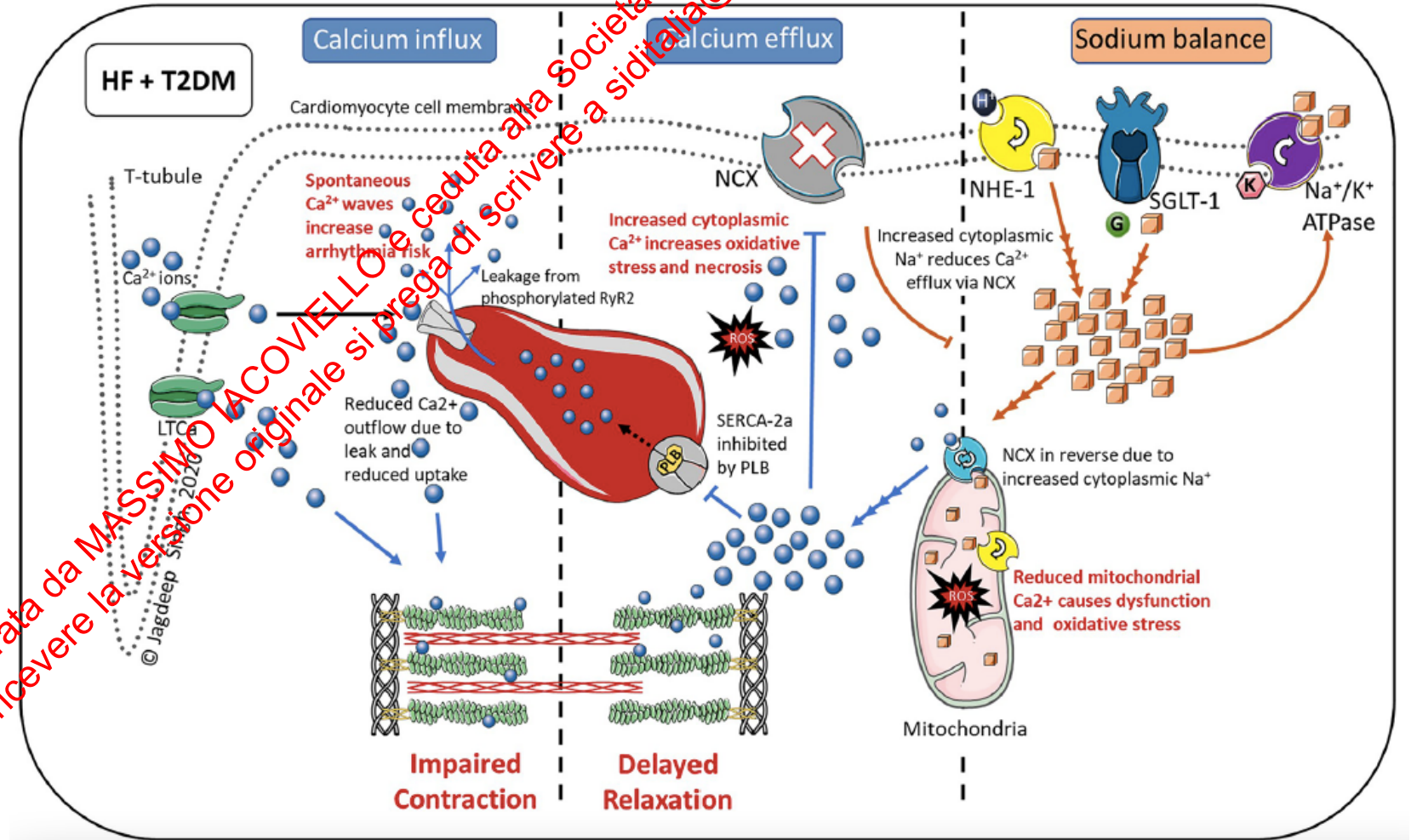
Diapositiva preparata da MASSIMO IACOVELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it



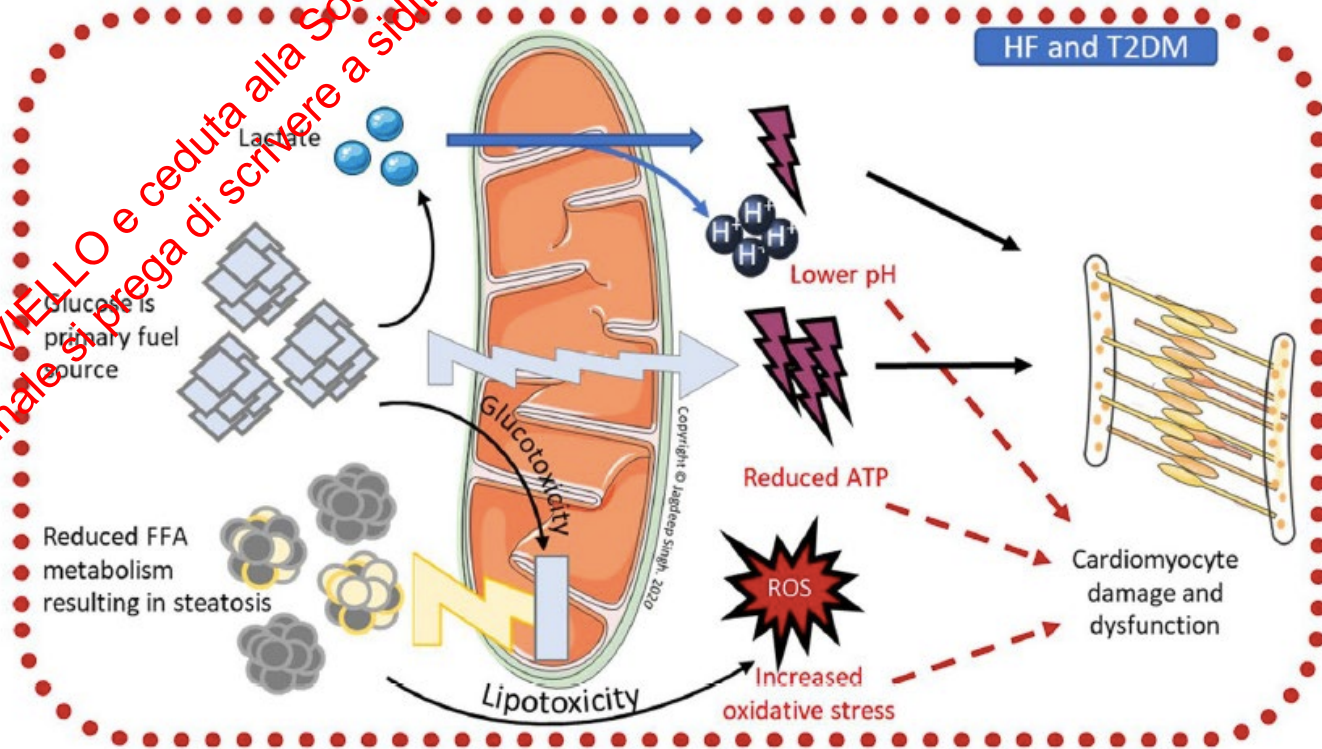
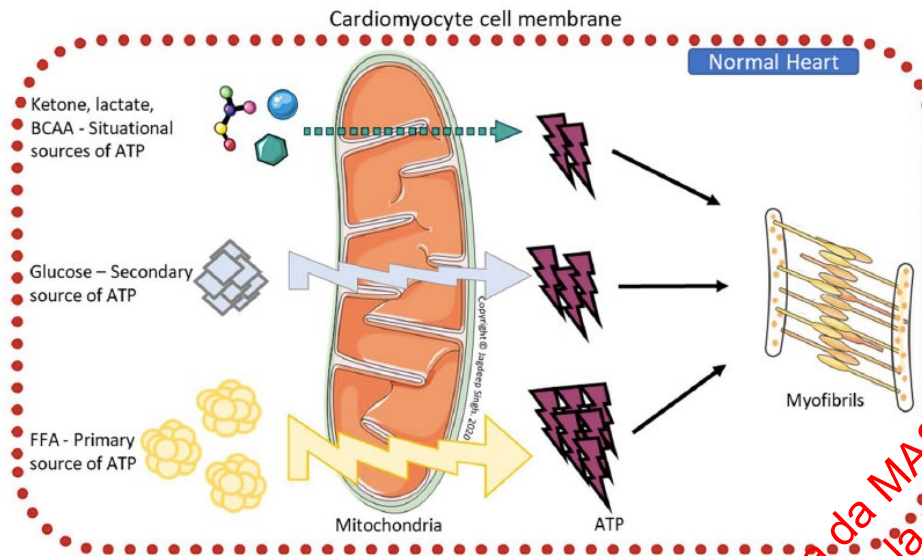
Il circolo vizioso della disfunzione ventricolare nel diabete mellito

M. Iacoviello

Energetica miocardica e sodium balance



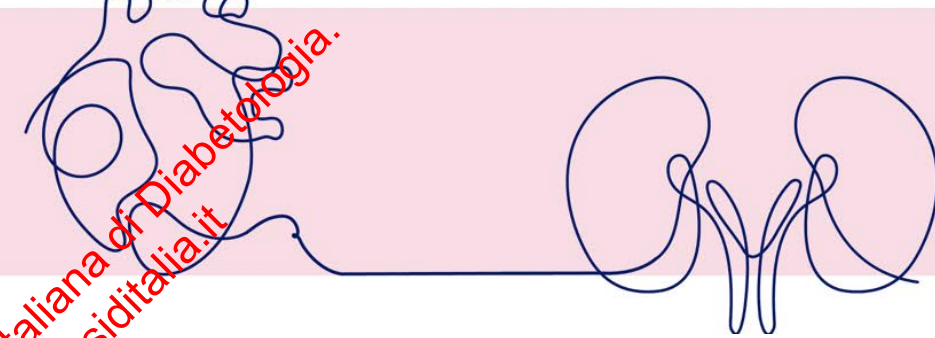
Energetica miocardica e sodium balance



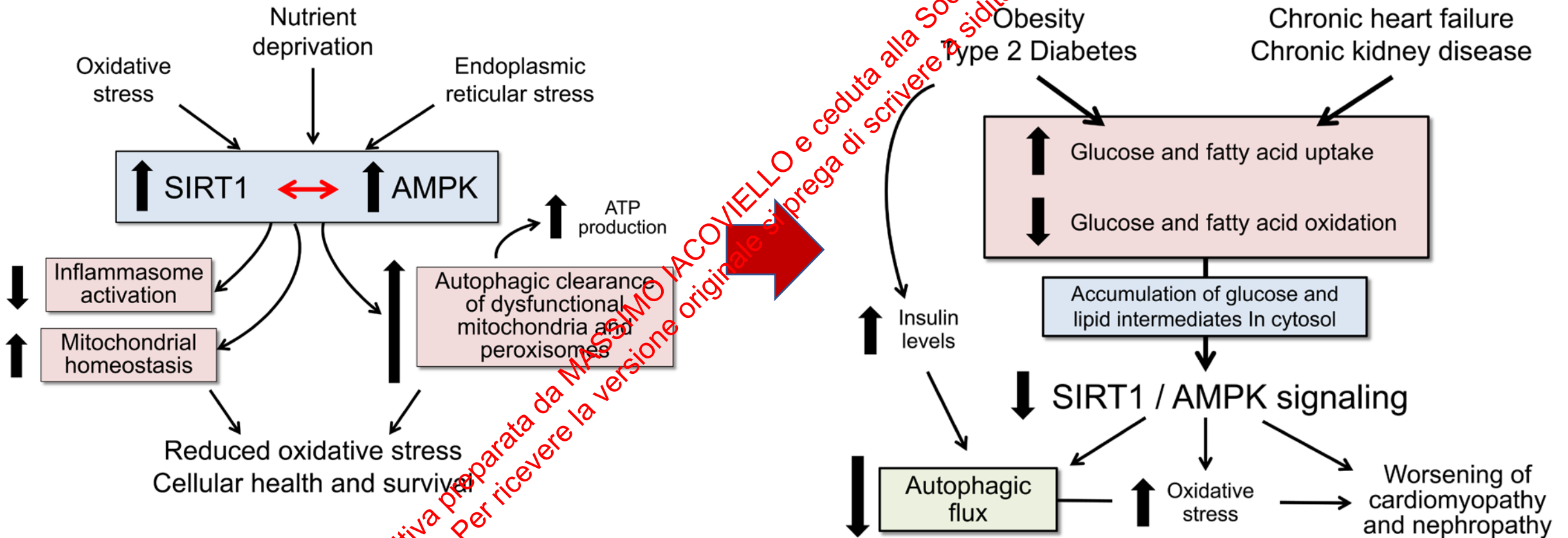
Lipotoxic intermediates

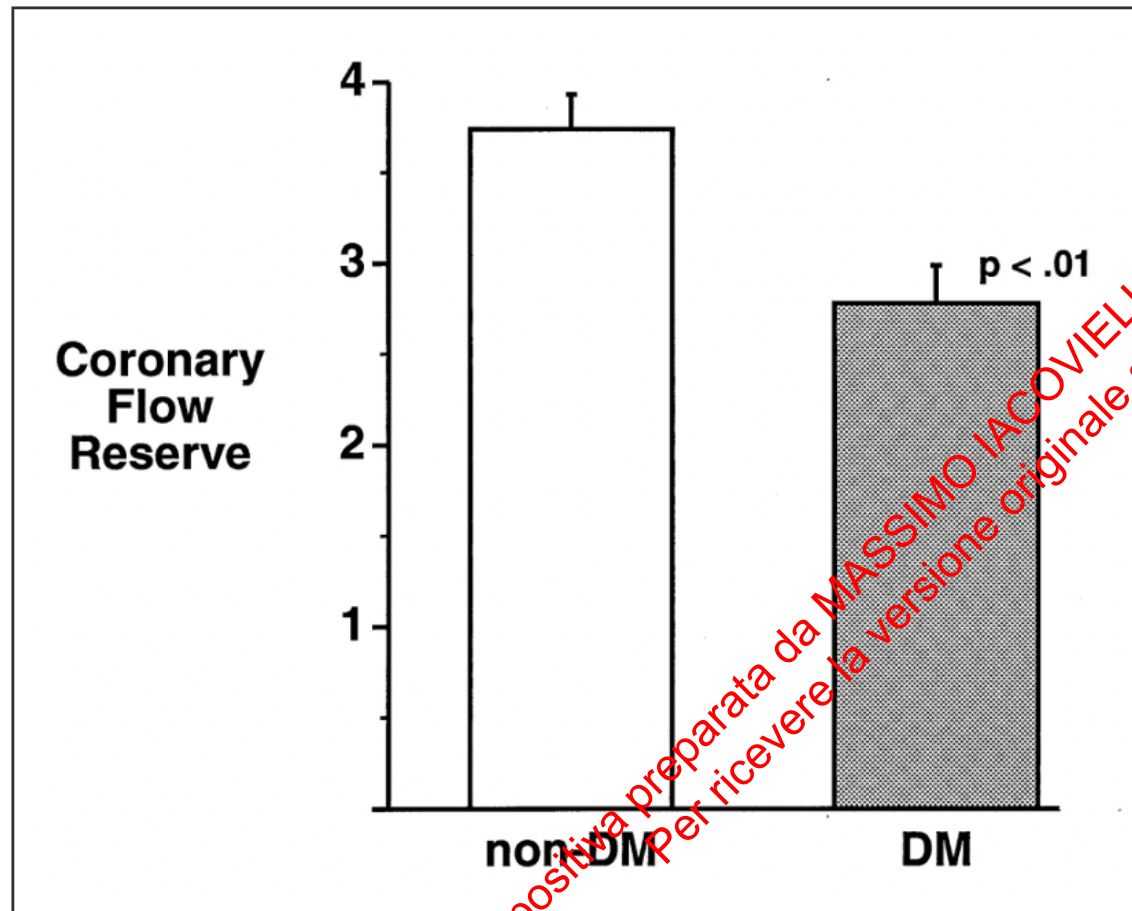
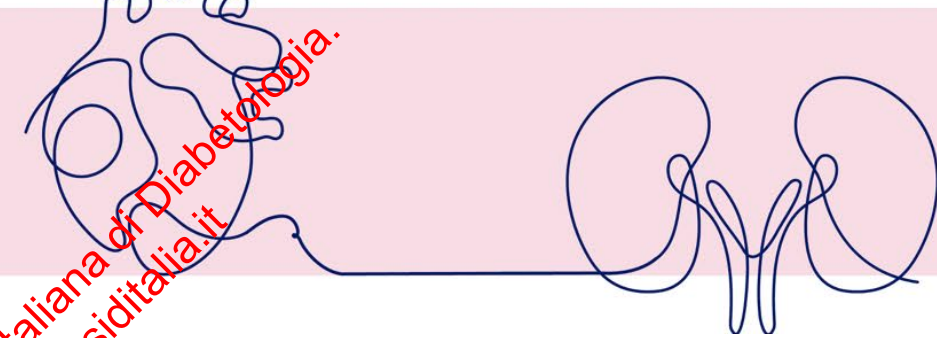
- Acylcarnitine
- Diacylglycerol
- Ceramides

Advanced glycation end
products (AGEs)

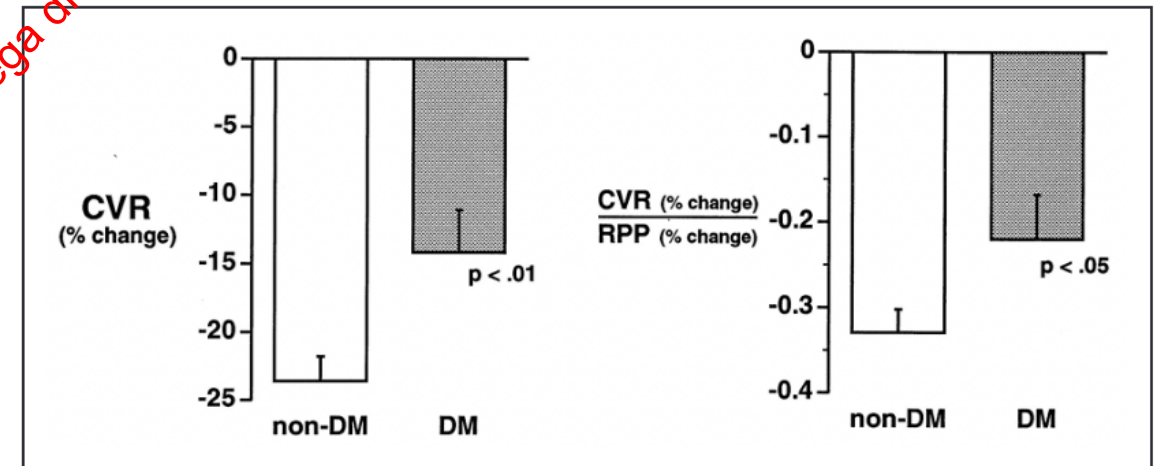


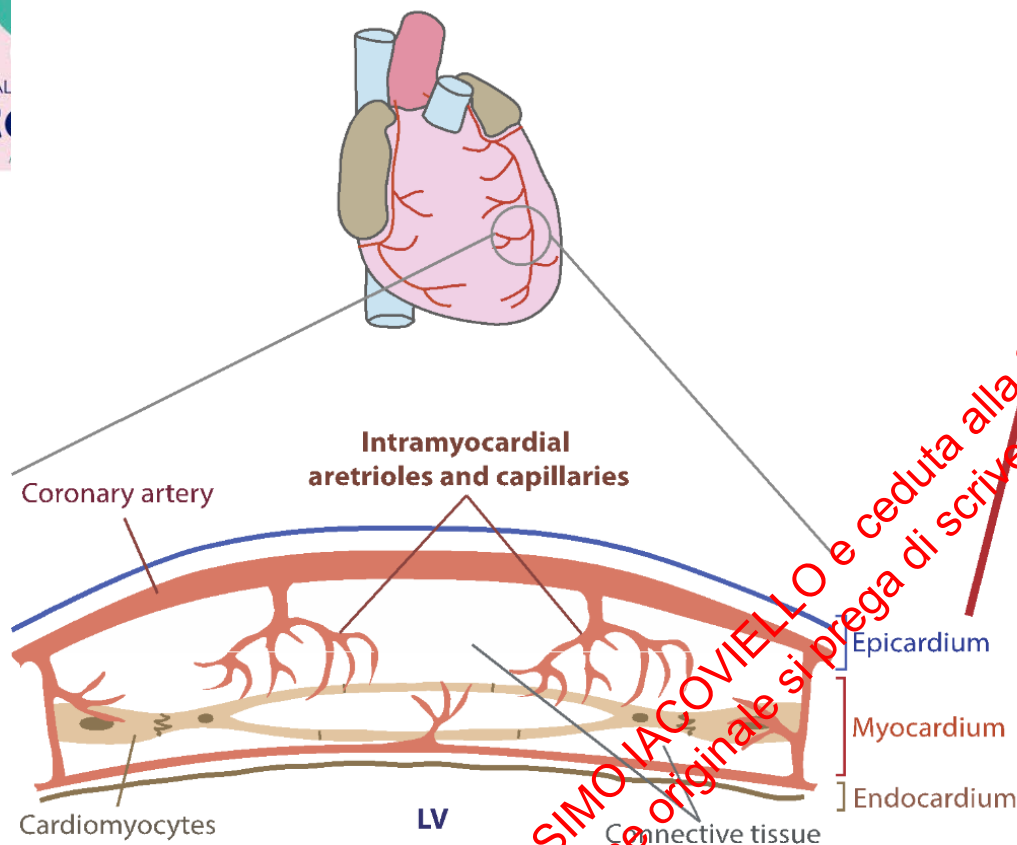
Nutrient surplus signaling





Disfunzione del microcircolo / endoteliale e riserva coronarica





Coronary microvascular dysfunction

Luminal narrowing of arterioles and capillaries
Impaired microvascular remodelling
Capillary rarefaction
ECs dysfunction
Reduced dilatation to hypoxia
Increased minimal coronary resistance

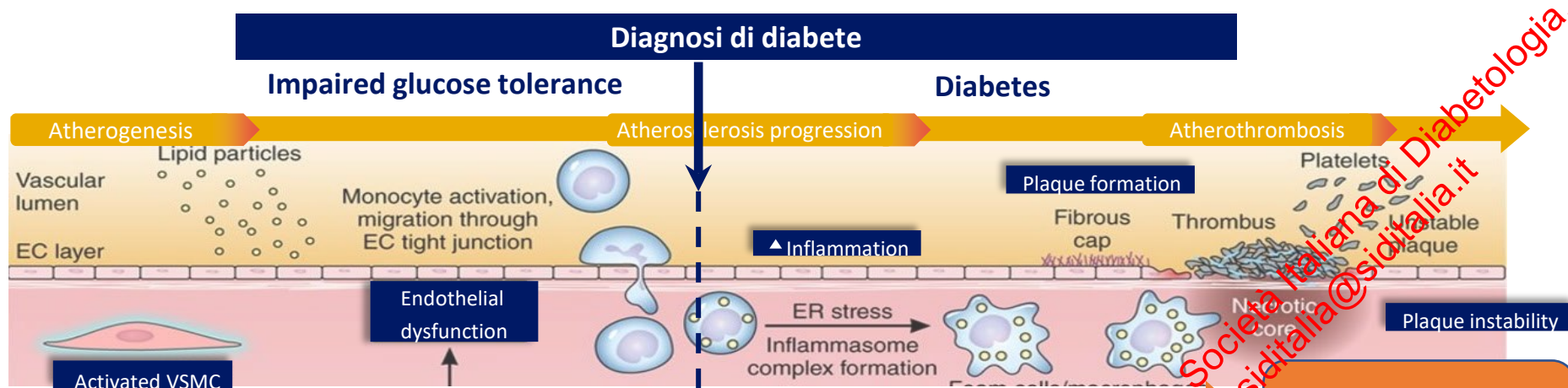
↓ **Coronary flow reserve**
Effort and/or rest angina or angina-like symptoms

Diabetic cardiomyopathy

Cardiomyocyte apoptosis, necrosis, fibrosis, and hypertrophy
Heart muscle remodelling
Heart muscle stiffness
EC damage with microvascular dysfunction

Disastolic dysfunction: HFpEF
Systolic dysfunction: HFrEF

Disfunzione del microcircolo



Complicanze macrovascolari

Alterazioni miocardio

- Alterazioni strutturali miocardio (ipertrofia/rimodellamento)
- Disfunzione endoteliale / microcircolo
- Metabolismo energetico miocardiociti - mitocondri

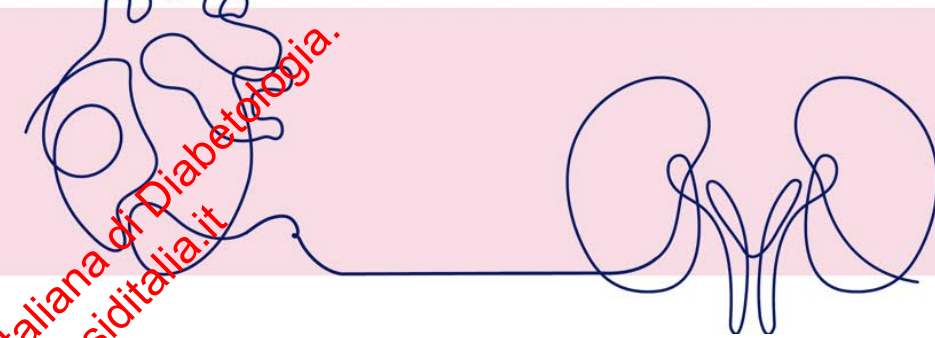
Attivazione neuro-ormonale

Infiammazione

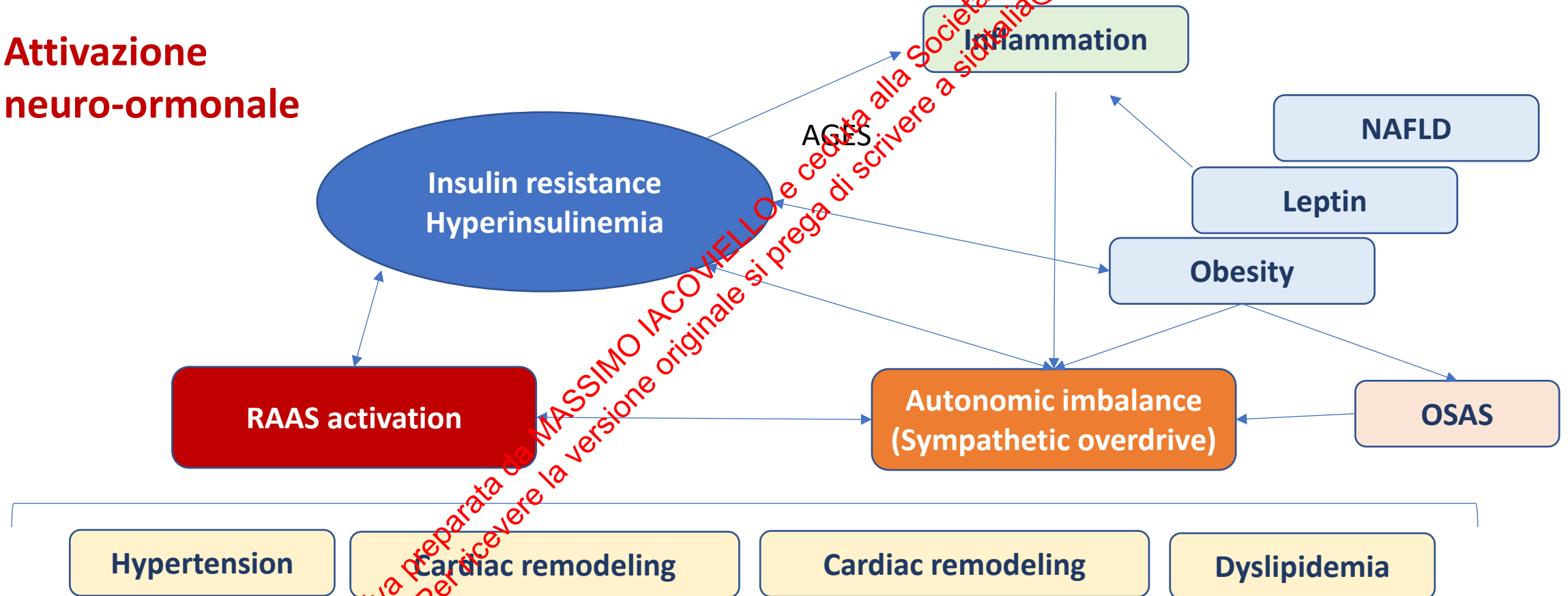
Sindrome coronarica

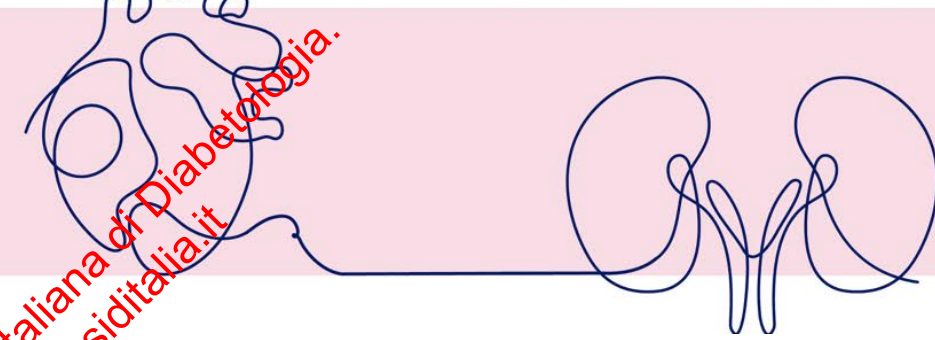
Disfunzione miocardica sistolica e/o diastolica

Scompenso cardiaco

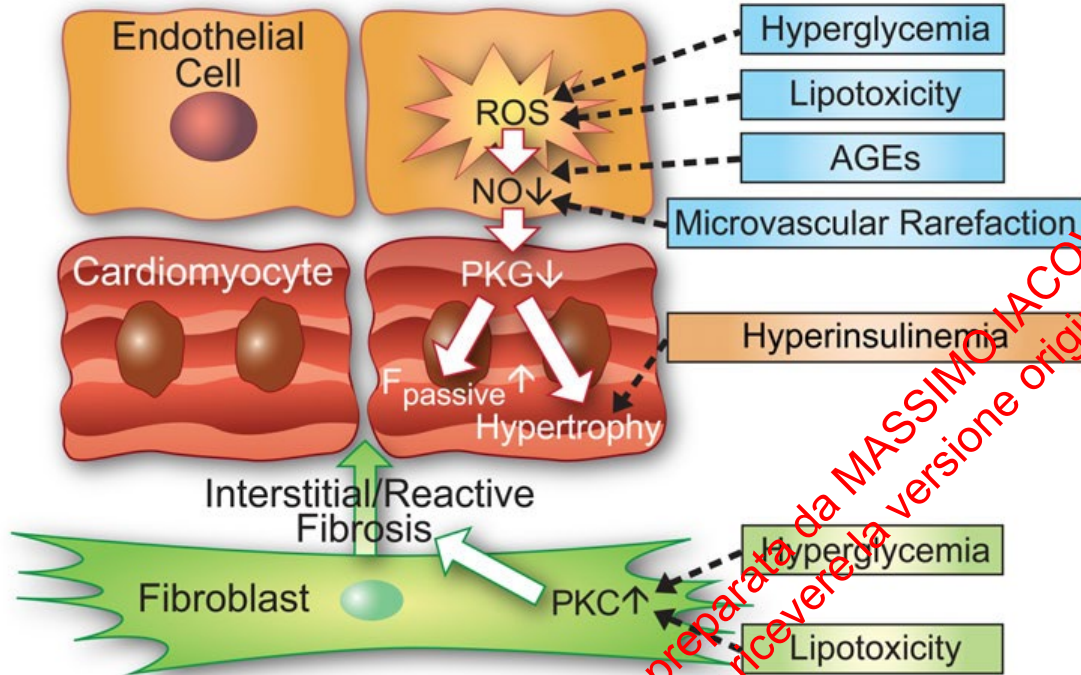


Attivazione neuro-ormonale

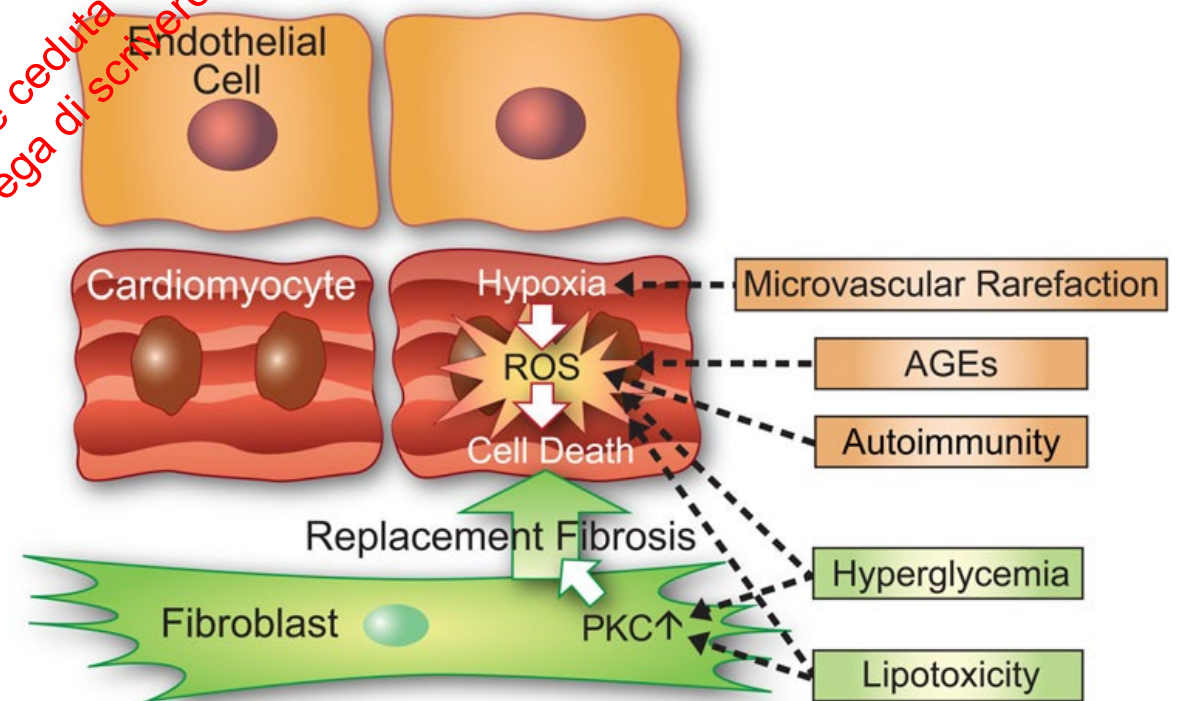




Clinical DMCMP with Restrictive/HFPEF Phenotype



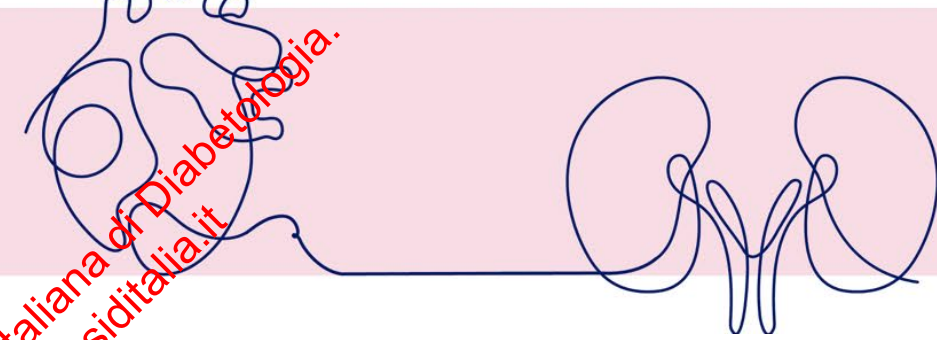
Clinical DMCMP with Dilated/HFREF Phenotype



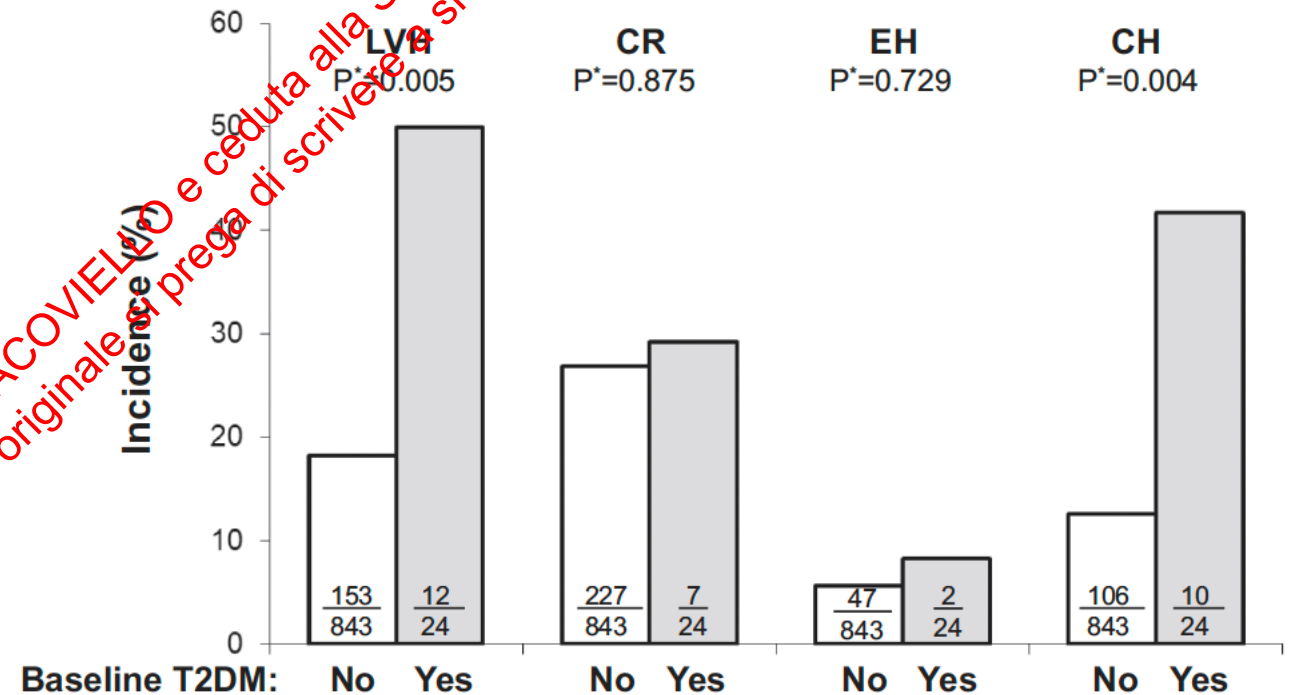
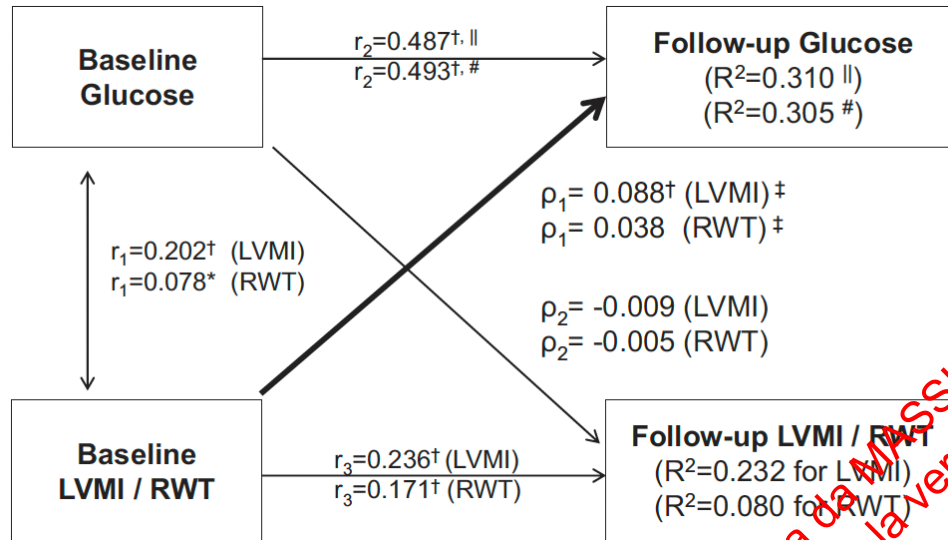
Diabete mellito ed alterazioni ecocardiografiche

Table 2 Conventional echocardiographic parameters

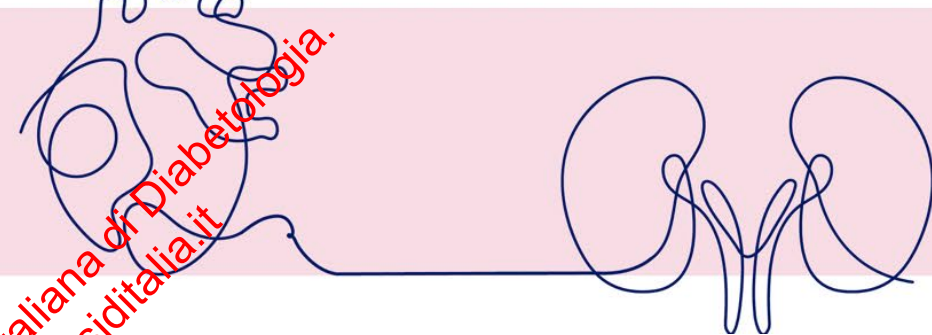
	Control (N = 80)	Group I(DM) (N = 70)	Group II (DM+HTA) (N = 70)	Group III (DM+CAD) (N = 70)	p
Left ventricular and left atrial geometry and mass					
LV EDD (cm)	5.03 ± 0.42	5.07 ± 0.44	5.14 ± 0.47	5.15 ± 0.56	0.386
LV ESD (cm)	3.43 ± 0.31 ^{ab}	3.53 ± 0.41 ^a	3.64 ± 0.43	3.67 ± 0.48	<0.001
LVM (g)	101.76 ± 11.41 ^{ab}	119.27 ± 20.01	122.80 ± 20.18	119.50 ± 20.01	<0.001
LVM index (g/m ²)	52.91 ± 4.29 ^{ab}	61.70 ± 8.71	60.85 ± 10.28	60.65 ± 12.37	<0.001
LV RWT	0.40 ± 0.04 ^{ab}	0.43 ± 0.04	0.43 ± 0.05	0.42 ± 0.03	<0.001
LV concentric remodeling, n (%)	24 (30) ^{ab}	40 (57)	31 (44)	40 (57)	0.002
LAV (ml)	23.34 ± 3.75 ^{ab}	30.53 ± 5.86	33.17 ± 7.15	32.18 ± 10.45	<0.001
Left atrial volume index (ml/m ²)	12.22 ± 2.24 ^{ab}	15.61 ± 3.32	16.47 ± 3.77	16.31 ± 5.70	<0.001
Left ventricular systolic function					
LV ejection fraction (%)	61.68 ± 5.49 ^{ab}	56.30 ± 5.64 ^s	53.43 ± 5.73	53.87 ± 7.11	<0.001
LV fraction of shortening (%)	32.53 ± 3.75 ^{ab}	29.61 ± 3.37 ^{sa}	27.40 ± 3.21	27.71 ± 4.05	<0.001
MAPSE (mm)	16.43 ± 1.56 ^{ab}	14.93 ± 2.20 ^{sa}	13.83 ± 1.60	13.82 ± 1.65	<0.001
Left ventricular diastolic function					
E/A ratio	1.30 ± 0.25 ^{ab}	1.10 ± 0.32 ^s	0.95 ± 0.25	1.05 ± 0.31	<0.001
E deceleration time (msec)	161.99 ± 21.80 ^{ab}	196.83 ± 38.93 ^s	206.73 ± 38.86	203.59 ± 34.64	<0.001
IsoVolumic Relaxation Time (msec)	84.35 ± 29.25 ^{ab}	89.74 ± 12.90 ^s	96.06 ± 9.67	94.07 ± 13.04	<0.001
E _{peak} (m/s)	0.1015 ± 0.03 ^{ab}	0.0794 ± 0.03	0.0701 ± 0.03	0.0711 ± 0.04	<0.001
E/E _{peak}	7.40 ± 1.42 ^{ab}	10.11 ± 3.27	10.22 ± 3.18	10.36 ± 2.98	<0.001
SD ratio	1.37 ± 0.16 ^{ab}	1.34 ± 0.21	1.24 ± 0.29	1.23 ± 0.27	<0.001
V _p (m/s)	0.75 ± 0.16 ^{ab}	0.56 ± 0.13	0.52 ± 0.09	0.52 ± 0.13	<0.001
Systolic and diastolic LV function					
Myocardial Performance Index	0.40 ± 0.05 ^{ab}	0.47 ± 0.07 ^s	0.51 ± 0.08	0.50 ± 0.08	<0.001



Alterazioni strutturali miocardio (ipertrofia/rimodellamento)



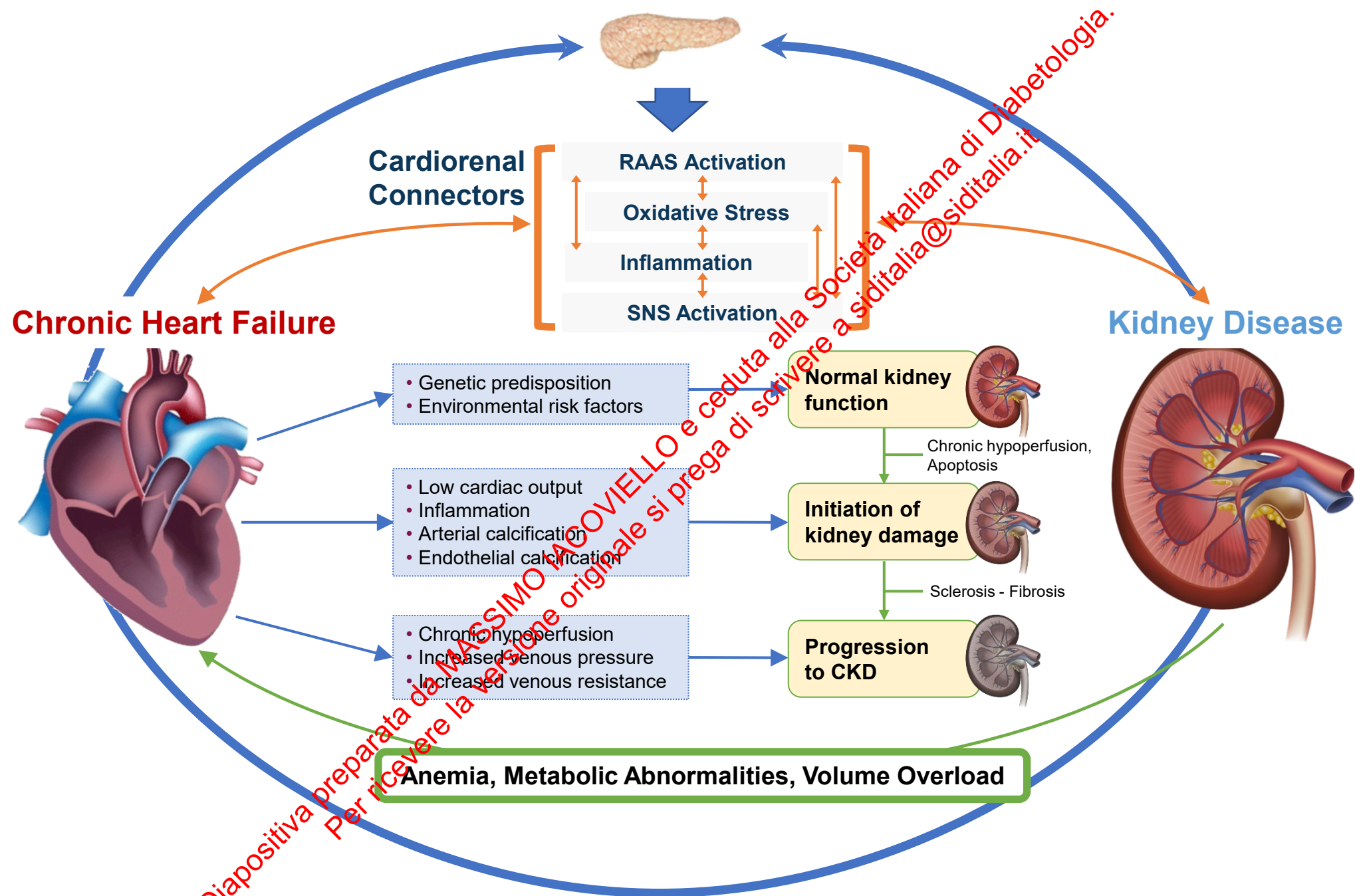
Incidence of left ventricular hypertrophy (LVH) and geometric remodeling patterns at follow-up by baseline type 2 diabetes (T2DM) in participants (n=867) who did not have LVH at baseline.

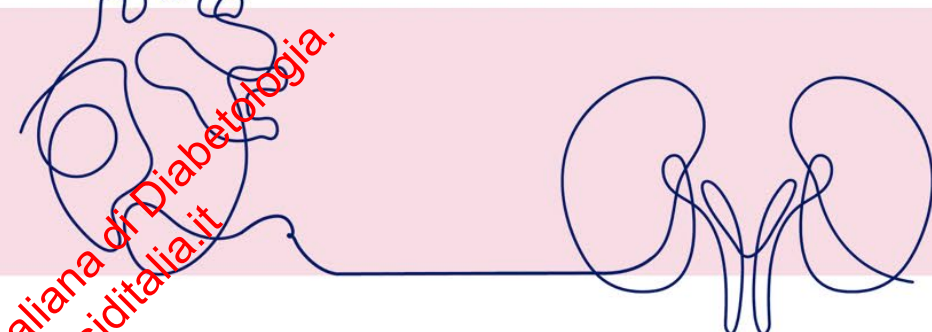


Agenda

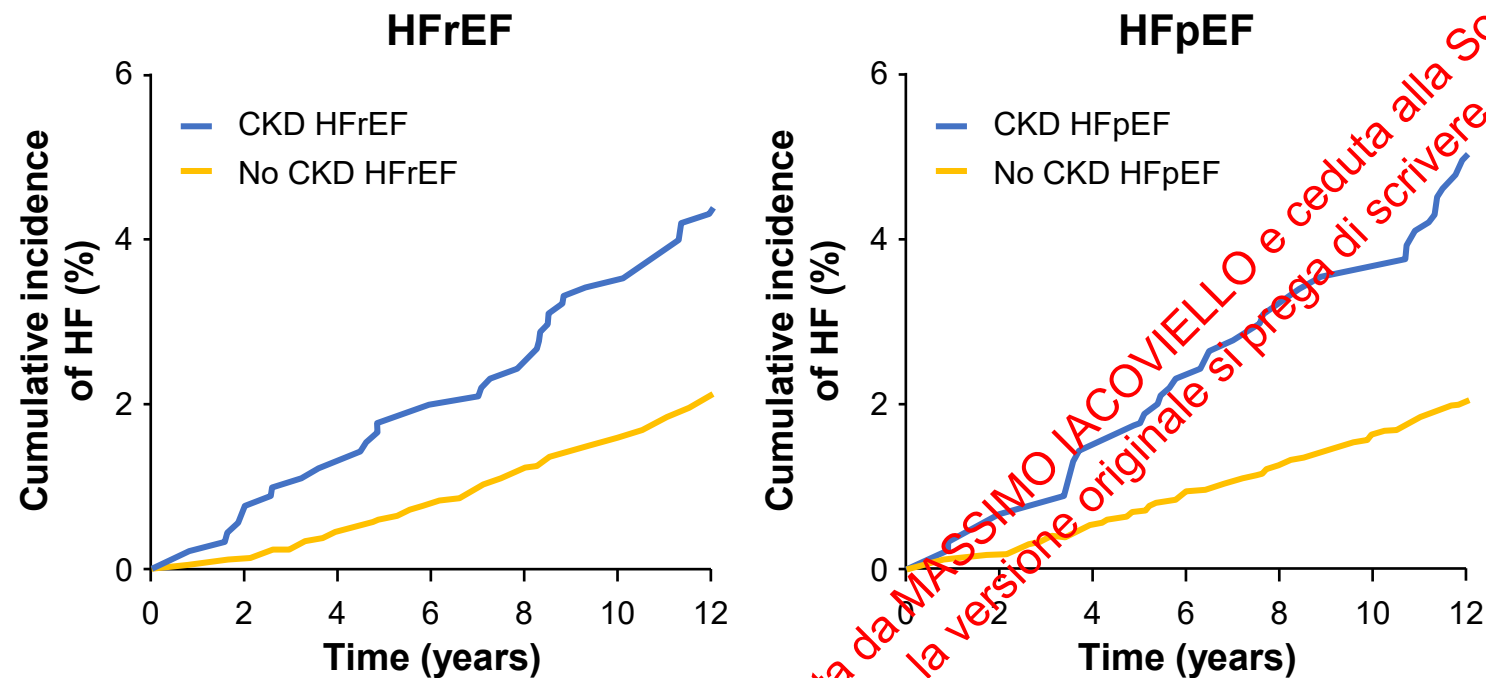
- Diabete e scompenso cardiaco: il rischio cardiovascolare non percepito
- Diabete e disfunzione sisto-diastolica: il background fisiopatologico
- **Il ruolo di obesità e CKD**
- Diabete e scompenso cardiaco: una relazione biunivoca
- La diagnosi precoce di scompenso cardiaco

Diapositiva preparata da MASSIMO IACOVELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it



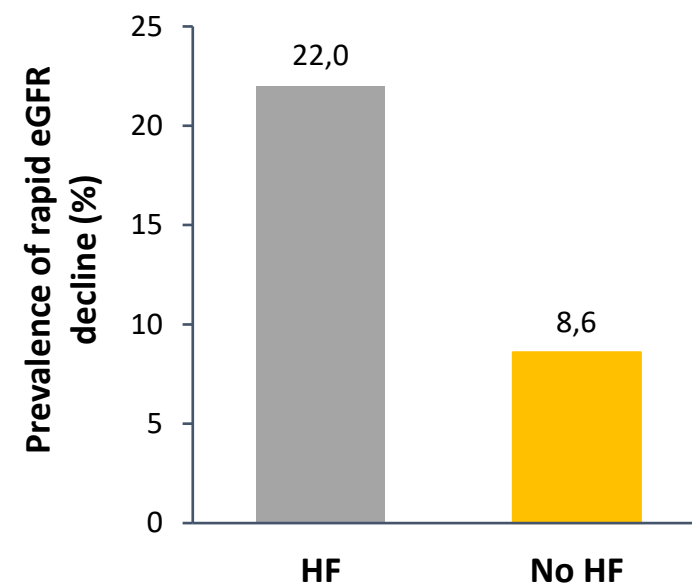


Incidences of HF are higher in those with CKD than those without¹

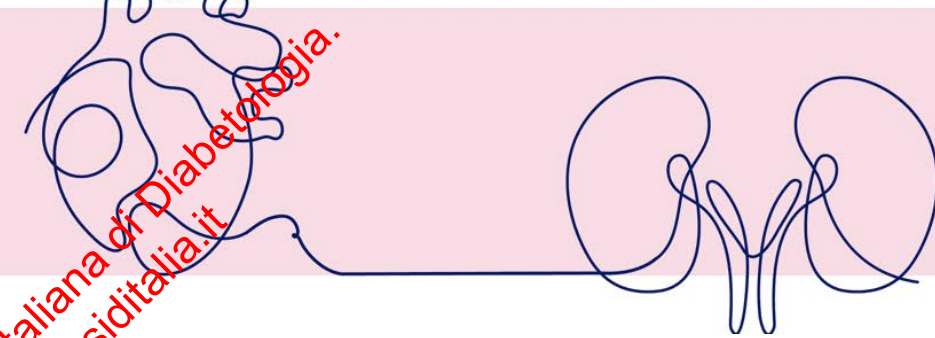


CKD is associated with incident HF

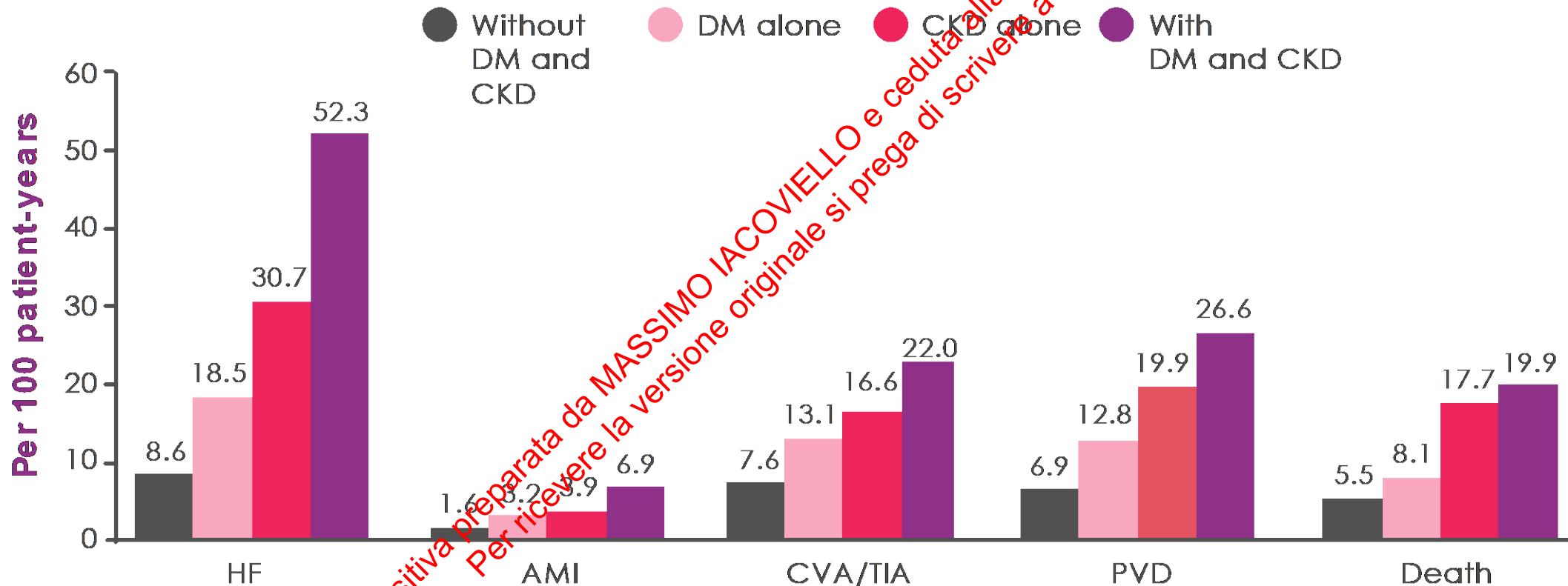
HF is associated with rapid
decline in eGFR^{2,a}



**HF is associated with the risk
of kidney function decline**

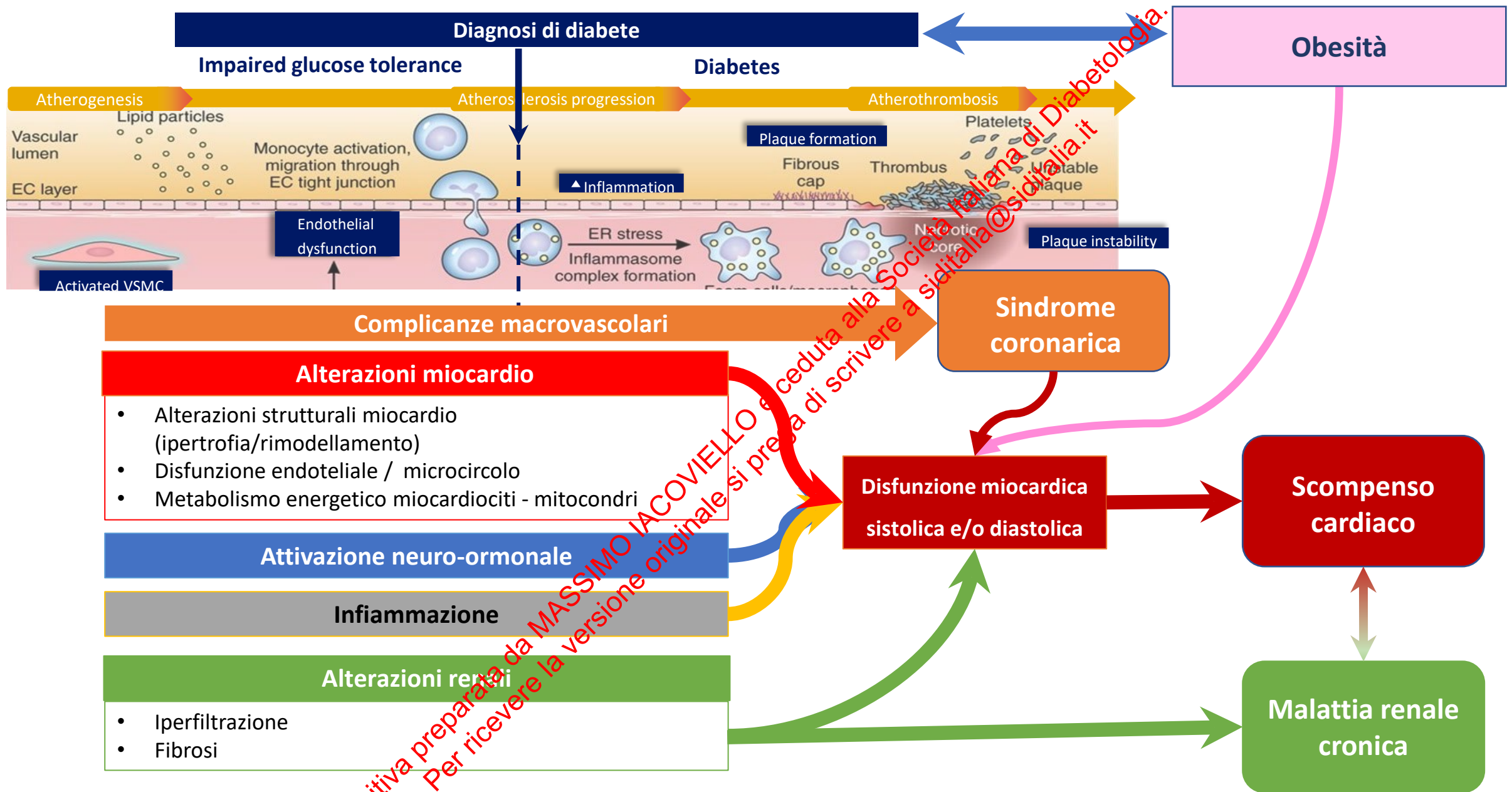


Malattia renale cronica, diabete e malattie cardiovascolari



AMI, acute myocardial infarction; CKD, chronic kidney disease; CV, cardiovascular; CVA/TIA, cerebrovascular attack/transient ischaemic attack; DM, diabetes mellitus; HF, heart failure; PVD, peripheral vascular disease

Adapted from: Foley RN *et al. J Am Soc Nephrol* 2005;16:489



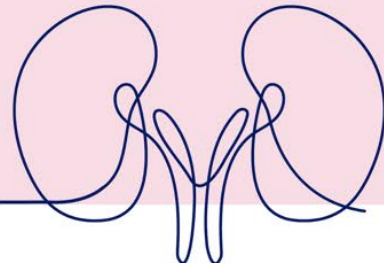
Diagnosi precoce e
trattamento efficace
della patologia

**CARDIONEFR
METABOLICA**



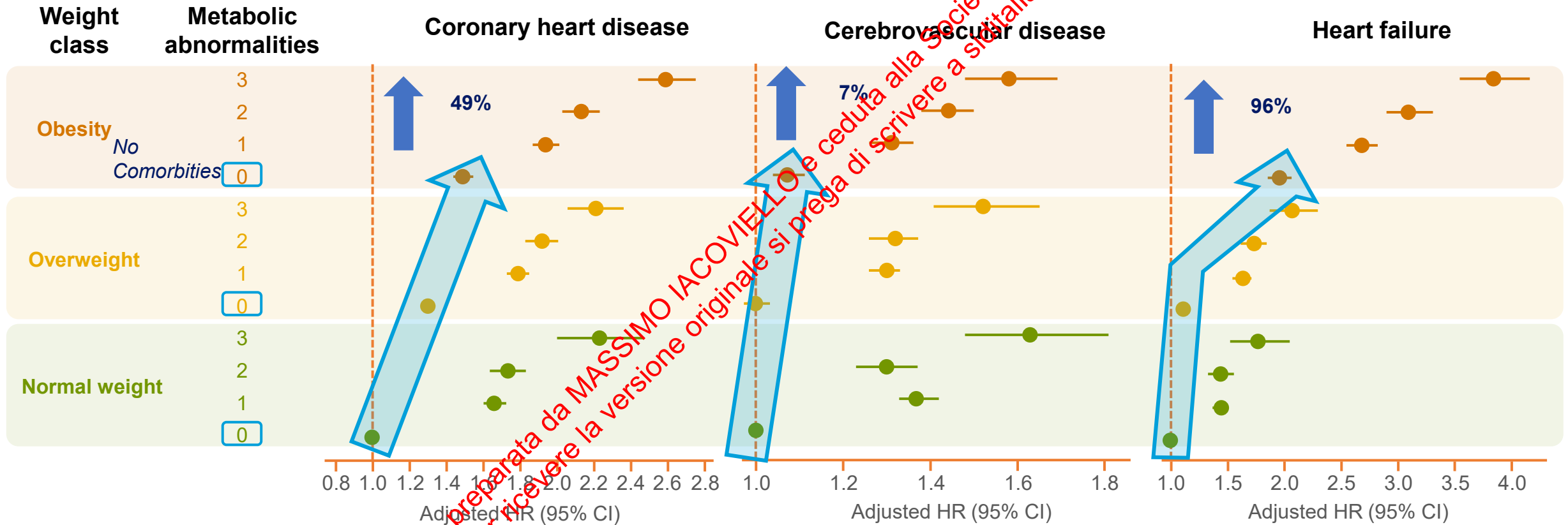
Il circolo vizioso della disfunzione ventricolare nel diabete mellito

M. Iacoviello



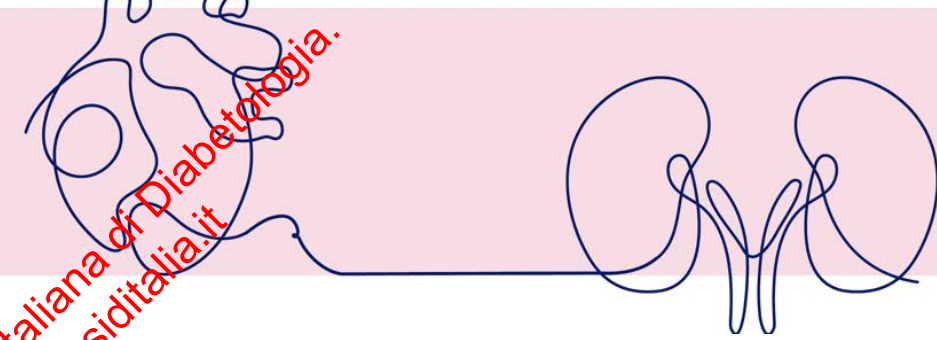
JACC
JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY

Metabolically Healthy Obese and Incident
Cardiovascular Disease Events Among
3.5 Million Men and Women

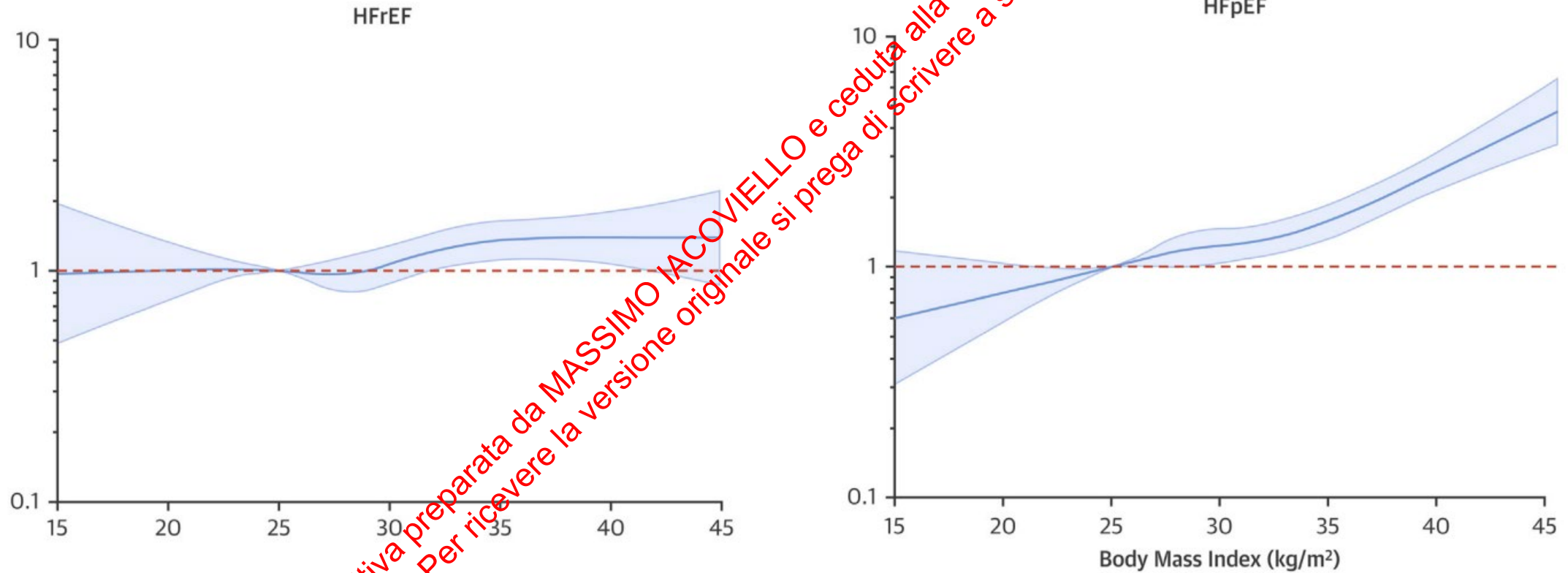


The three metabolic abnormalities (diabetes, hypertension and hyperlipidaemia) were summed to create a metabolic abnormalities score (0, 1, 2, and 3). †Analyses adjusted for age, sex, smoking status, and social deprivation. The reference category is normal weight, no metabolic abnormalities. CI, confidence interval; CHD, coronary heart disease; CVD, cardiovascular disease; HR, hazard ratio; PVD, peripheral vascular disease

Caleyachetty R et al. J Am Coll Cardiol 2017;70:1429–37.



Obesità e scompenso cardiaco



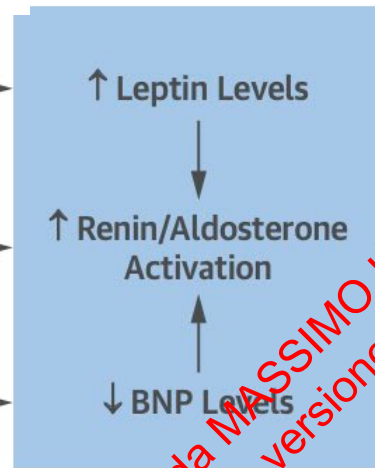
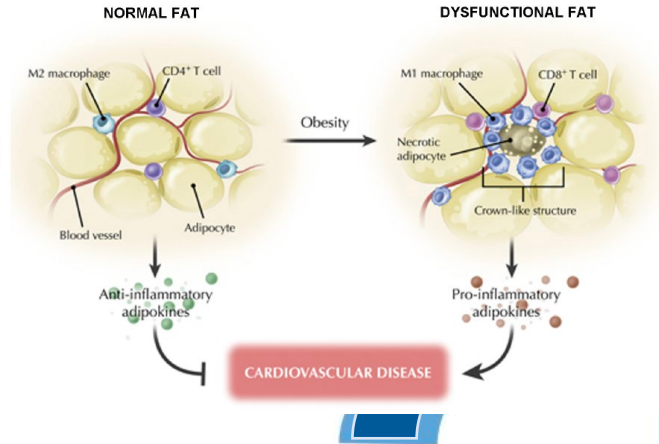
Diapositiva preparata da MASSIMO IACOVELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it

Diagnosi precoce e
trattamento efficace
della patologia

CARDIOFERO

Il circolo vizioso della disfunzione ventricolare nel diabete mellito

M. Iacoviello

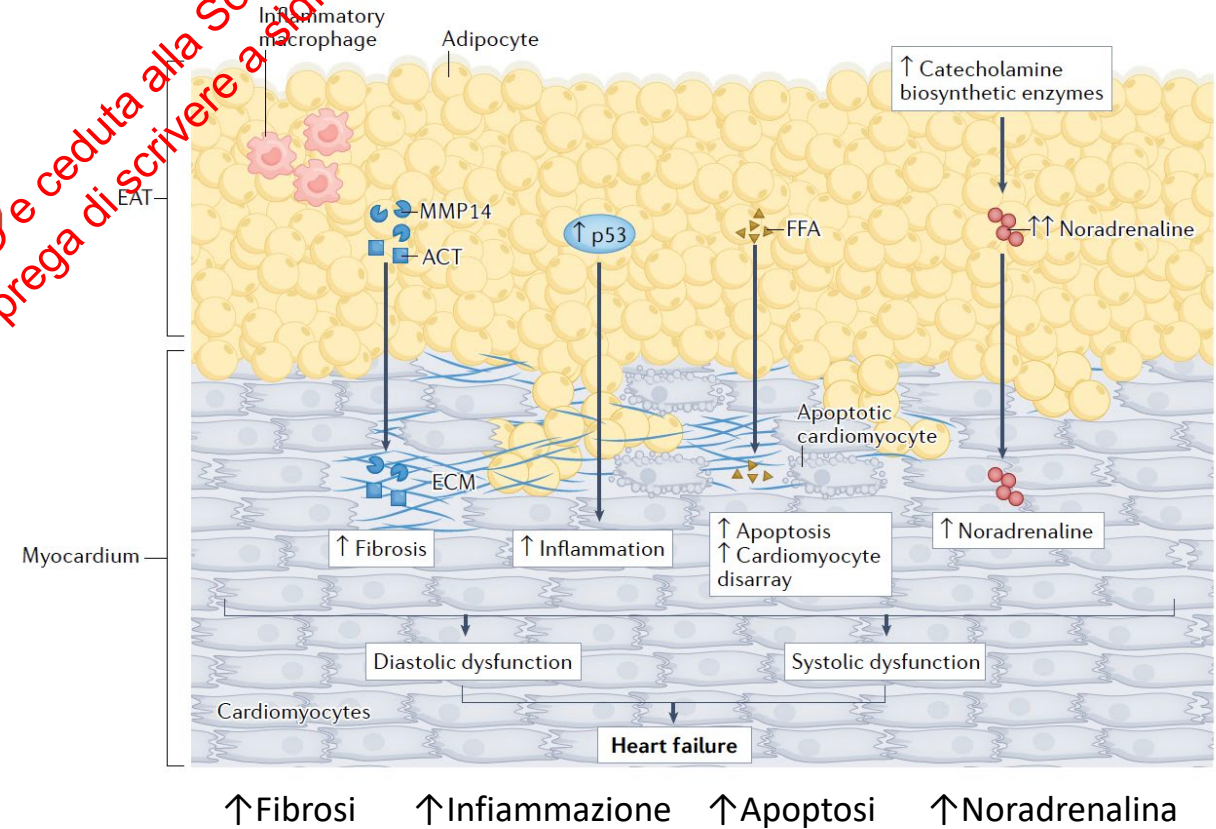
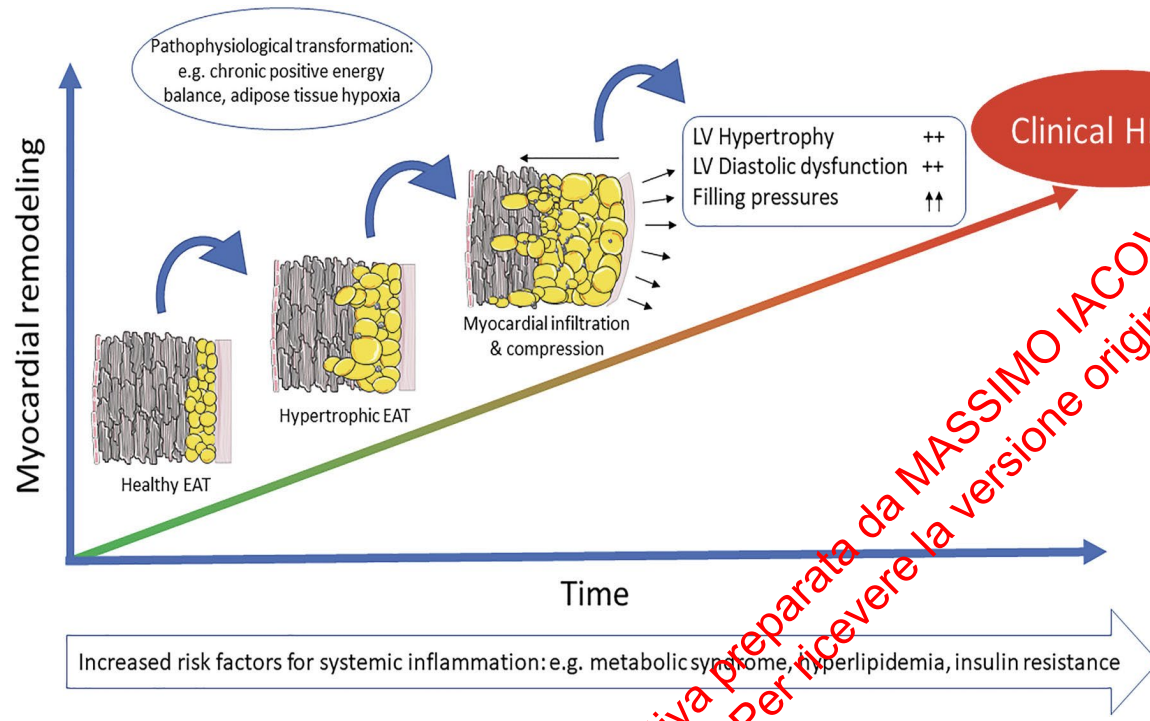


↑Epicardial fat
(compression,
inflammation)

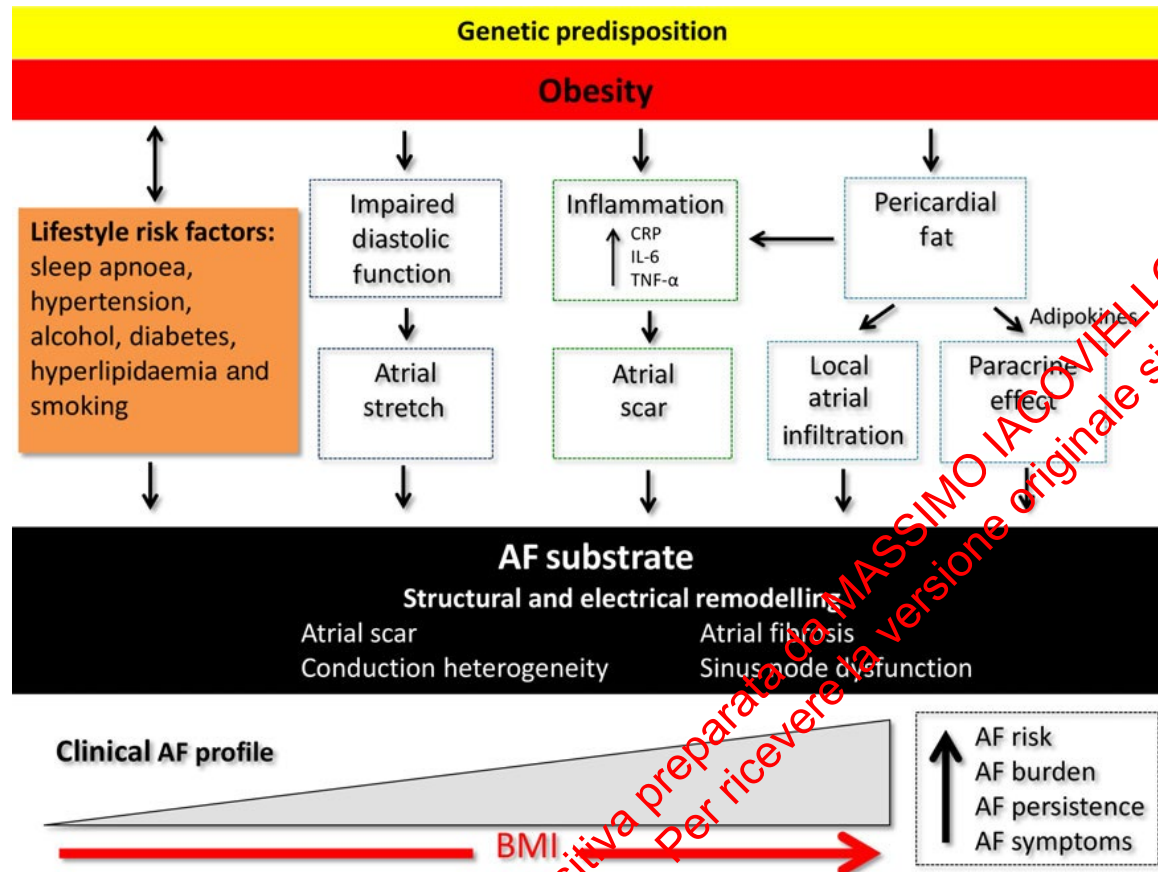
↑Cardiac stiffness
↑ Filling pressure

↑ Traditional CV Risk Factor Burden

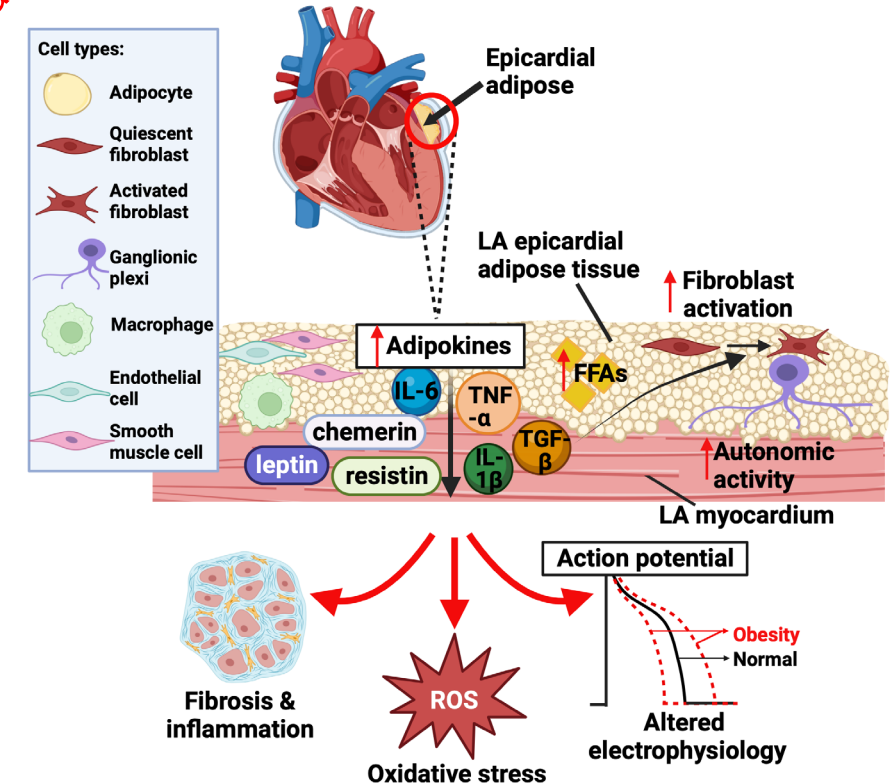
Obesità ed HFpEF: il ruolo del grasso epicardico

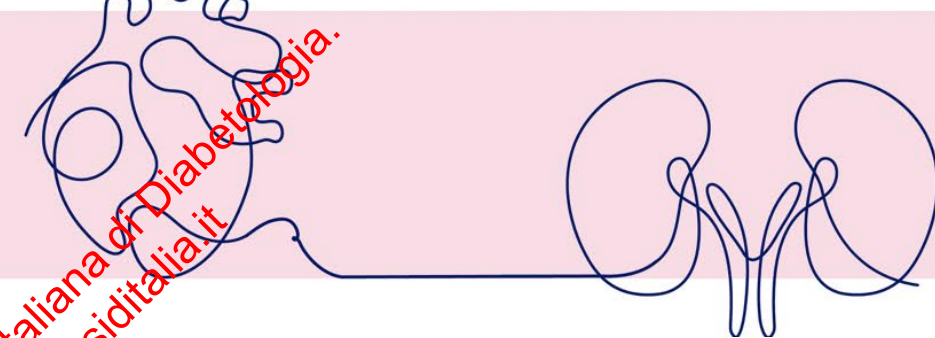


Obesità e fibrillazione atriale

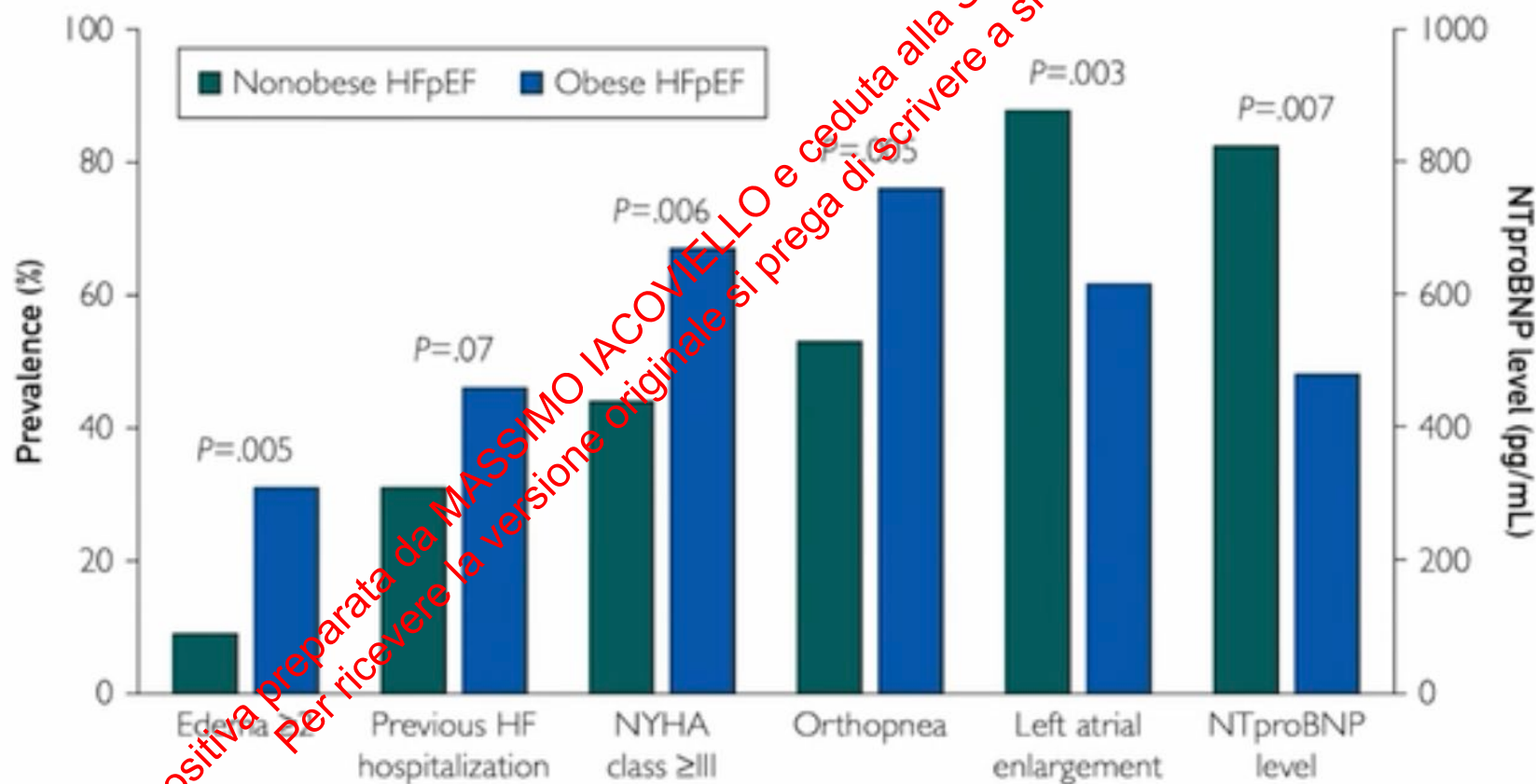


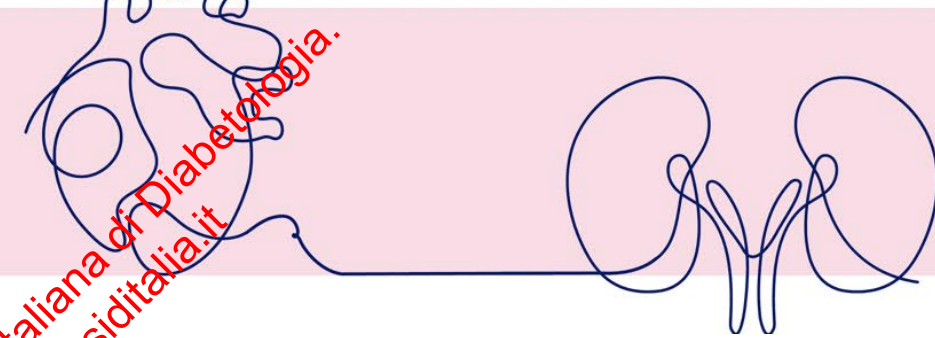
Epicardial Adipose Tissue in Obesity





Obesity and HFpEF





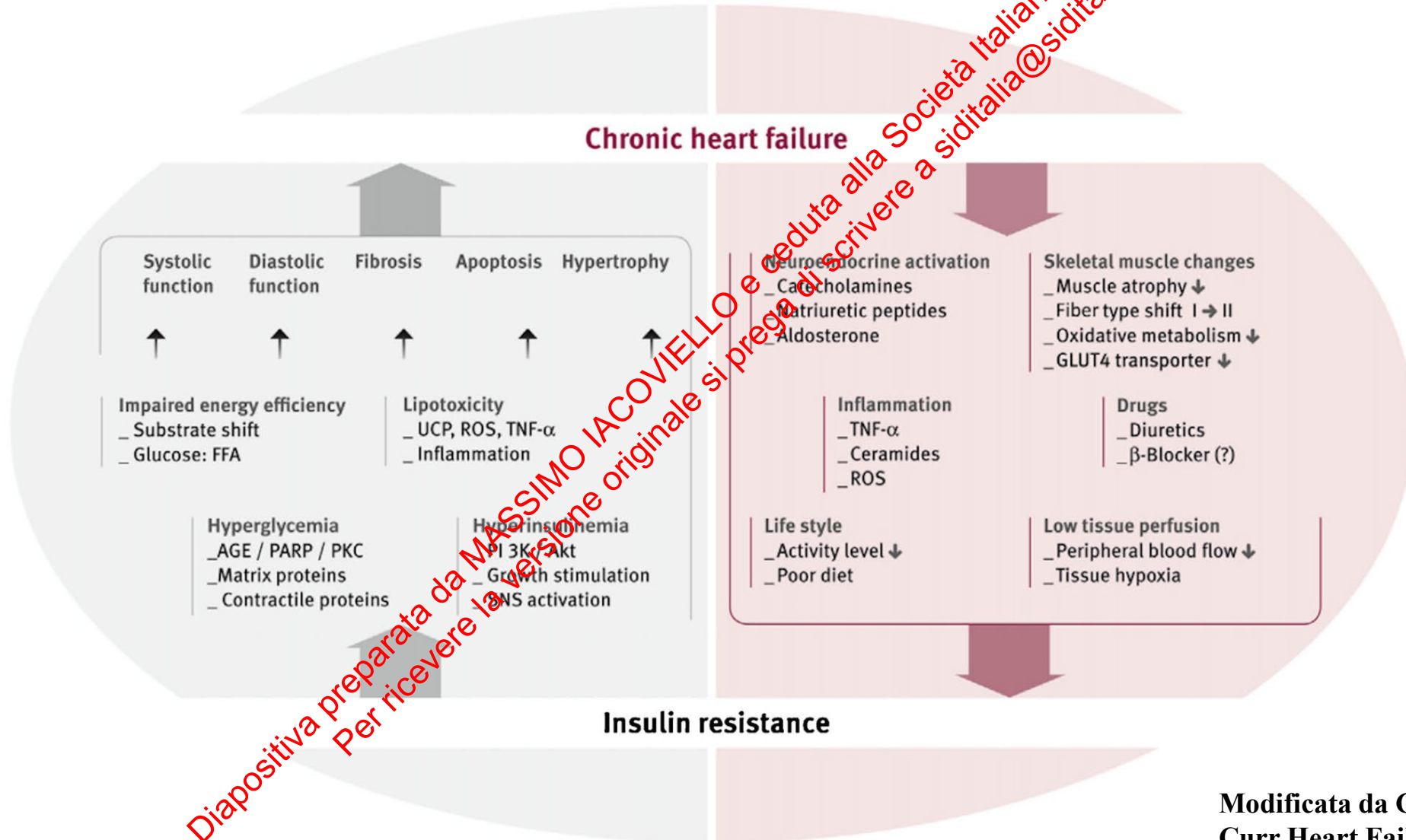
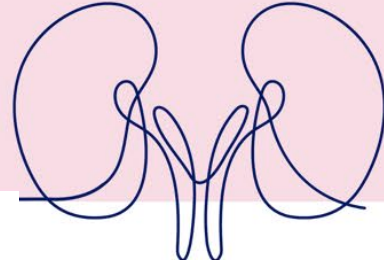
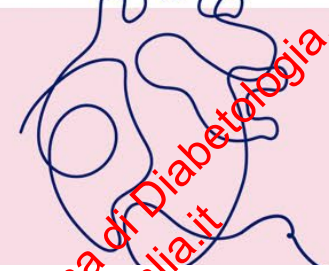
Agenda

- Diabete e scompenso cardiaco: il rischio cardiovascolare non percepito
- Diabete e disfunzione sisto-diastolica: il background fisiopatologico
- Diabete e disfunzione sisto-diastolica: il ruolo di obesità e CKD
- **Diabete e scompenso cardiaco: una relazione biunivoca**
- La diagnosi precoce di scompenso cardiaco

Diapositiva preparata da MASSIMO IACOVELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it

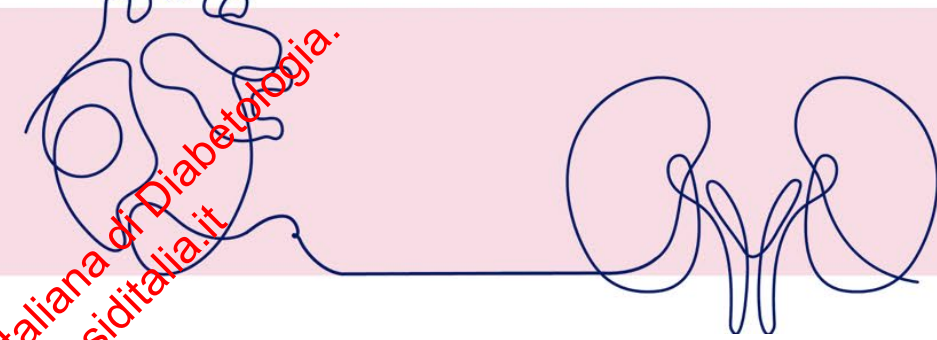
Il circolo vizioso della disfunzione ventricolare nel diabete mellito

M. Iacoviello



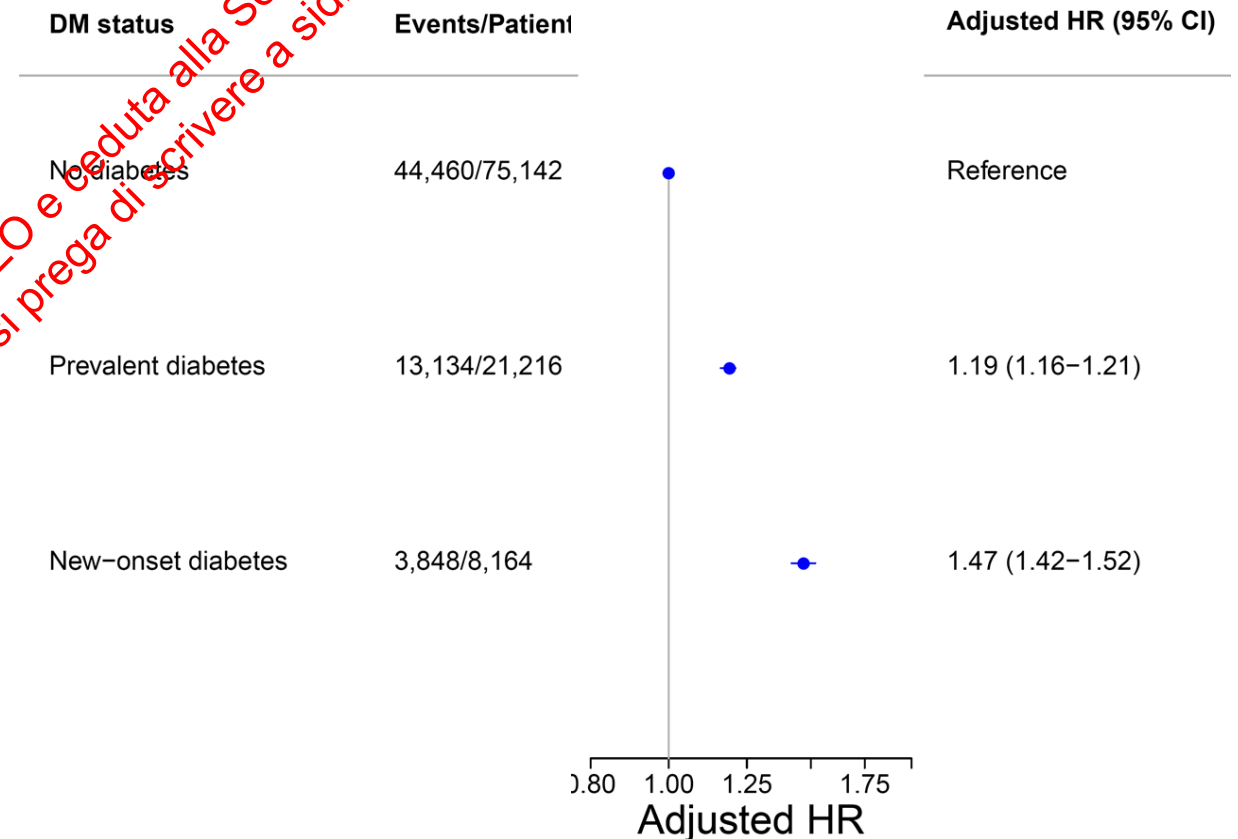
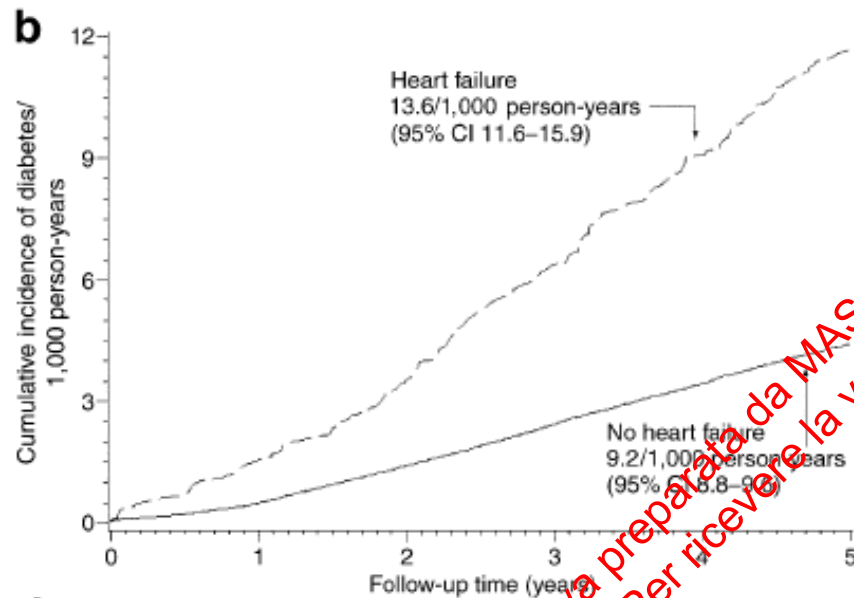
Il circolo vizioso della disfunzione ventricolare nel diabete mellito

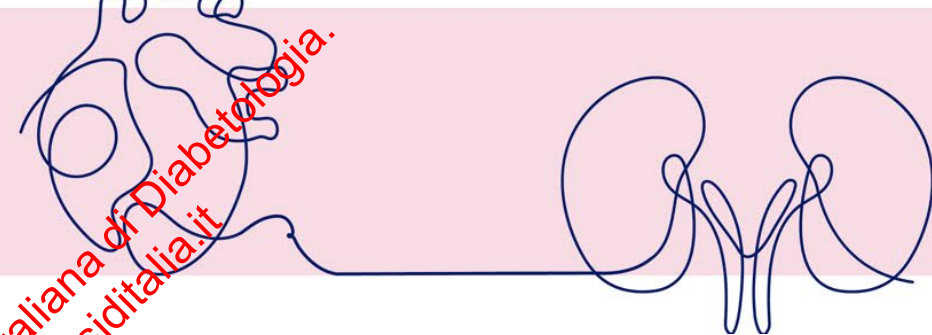
M. Iacoviello



58,056 non-diabetic adults aged ≥ 30 years with no evidence
of diabetes.

Heart failure was independently associated with an increase
in diabetes incidence of 48% (95% CI 27–73%)

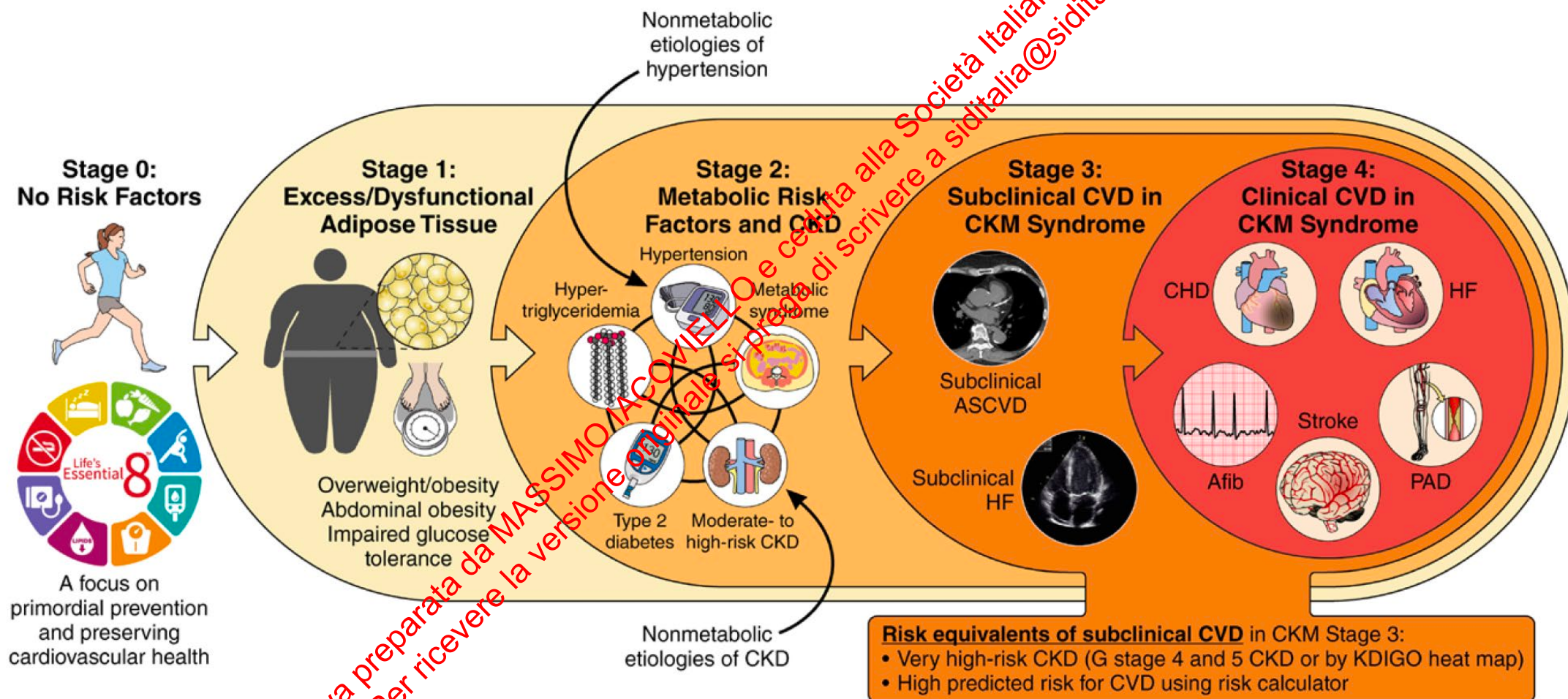


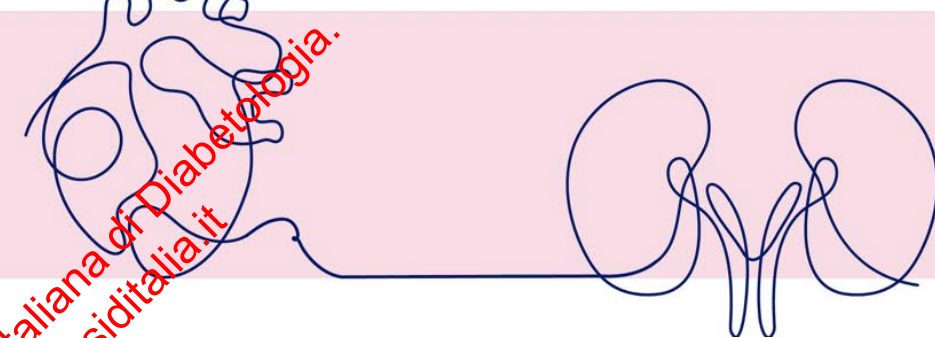


Agenda

- Diabete e scompenso cardiaco: il rischio cardiovascolare non percepito
- Diabete e disfunzione sisto-diastolica: background fisiopatologico
- Diabete e disfunzione sisto-diastolica: il ruolo di obesità e CKD
- Diabete e scompenso cardiaco: una relazione biunivoca
- **La diagnosi precoce di scompenso cardiaco**

Diapositiva preparata da MASSIMO IACOVIELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it





Adiposopatia

Fattori di rischio metabolici
- Ipertensione arteriosa

- Diabete

- GFR ≥ 60 with ACR ≥ 30
- GFR < 60

- GFR < 30
(Stage 4-5 KDIGO)

**Profilo metabolico
di rischio**

- Glicemia / Hb glicata
- Adiposopatia
- Assetto lipidico

Profilo renale

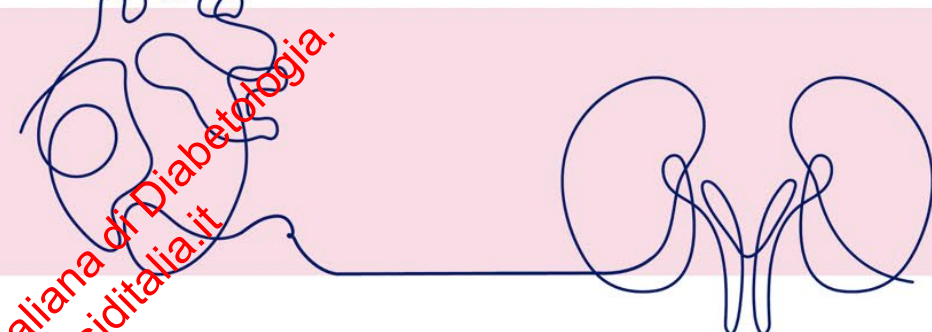
- Stimato GFR
- Albuminuria

Profilo cardiovascolare

- Ipertensione arteriosa /
Monitoraggio PA
- ECG

- Ecocardiogramma (se PN elevati o anomalie ECG)
- Peptidi natriuretici (sintomi HF)
- Eco-Doppler TSA/Arti inferiori

Diapositiva preparata da MASSIMO IACOVELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it

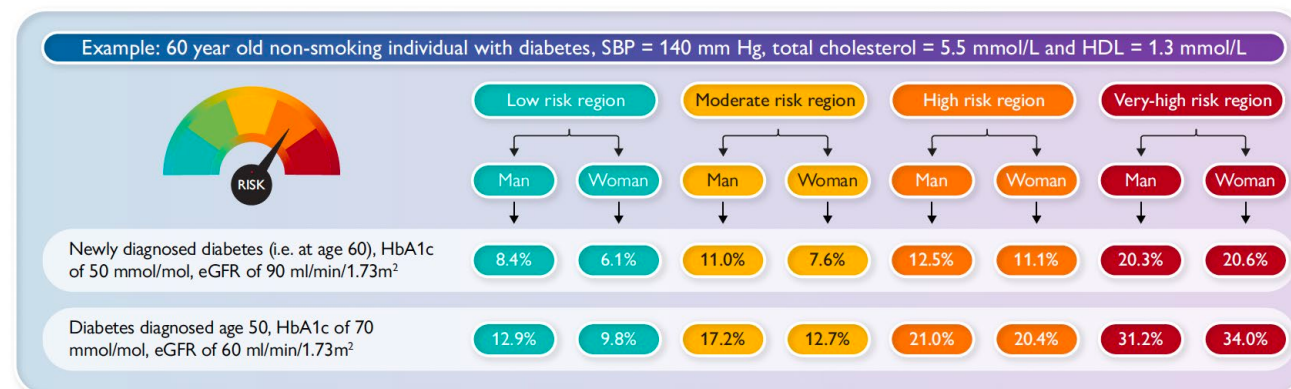
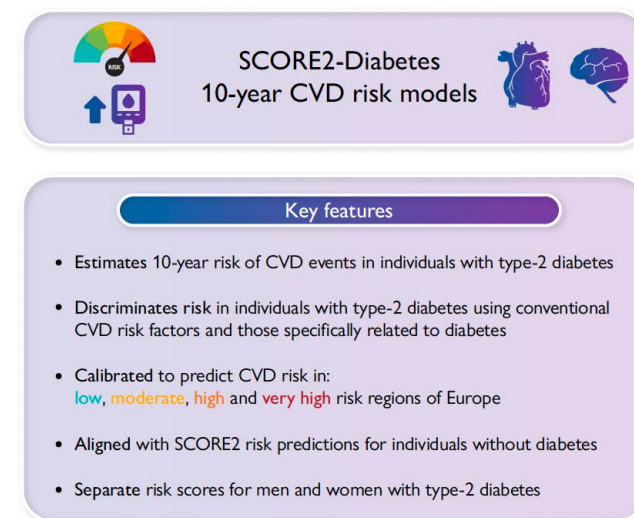
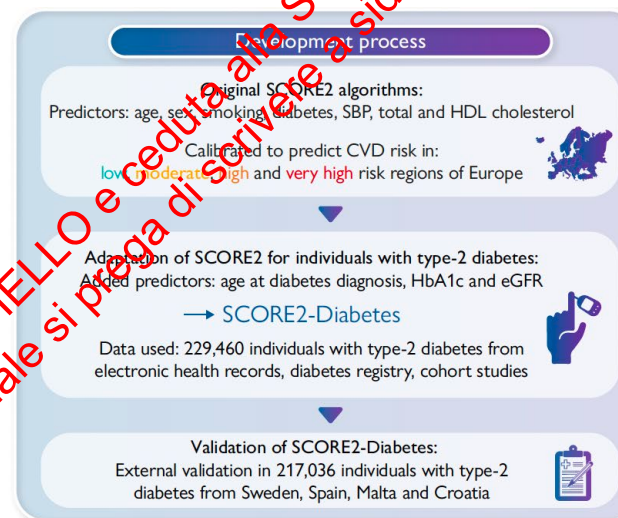


Stratificazione del rischio cardiovascolare

Table 7 Cardiovascular risk categories in type 2 diabetes

Very high CV risk	Patients with T2DM with: - Clinically established ASCVD or - Severe TOD or 10-year CVD risk $\geq 20\%$ using SCORE2-Diabetes
High CV risk	Patients with T2DM not fulfilling the very high-risk criteria and a: 10-year CVD risk 10 to $<20\%$ using SCORE2-Diabetes
Moderate CV risk	Patients with T2DM not fulfilling the very high-risk criteria and a: 10-year CVD risk 5 to $<10\%$ using SCORE2-Diabetes
Low CV risk	Patients with T2DM not fulfilling the very high-risk criteria and a: 10-year CVD risk $<5\%$ using SCORE2-Diabetes

© ESC 2023



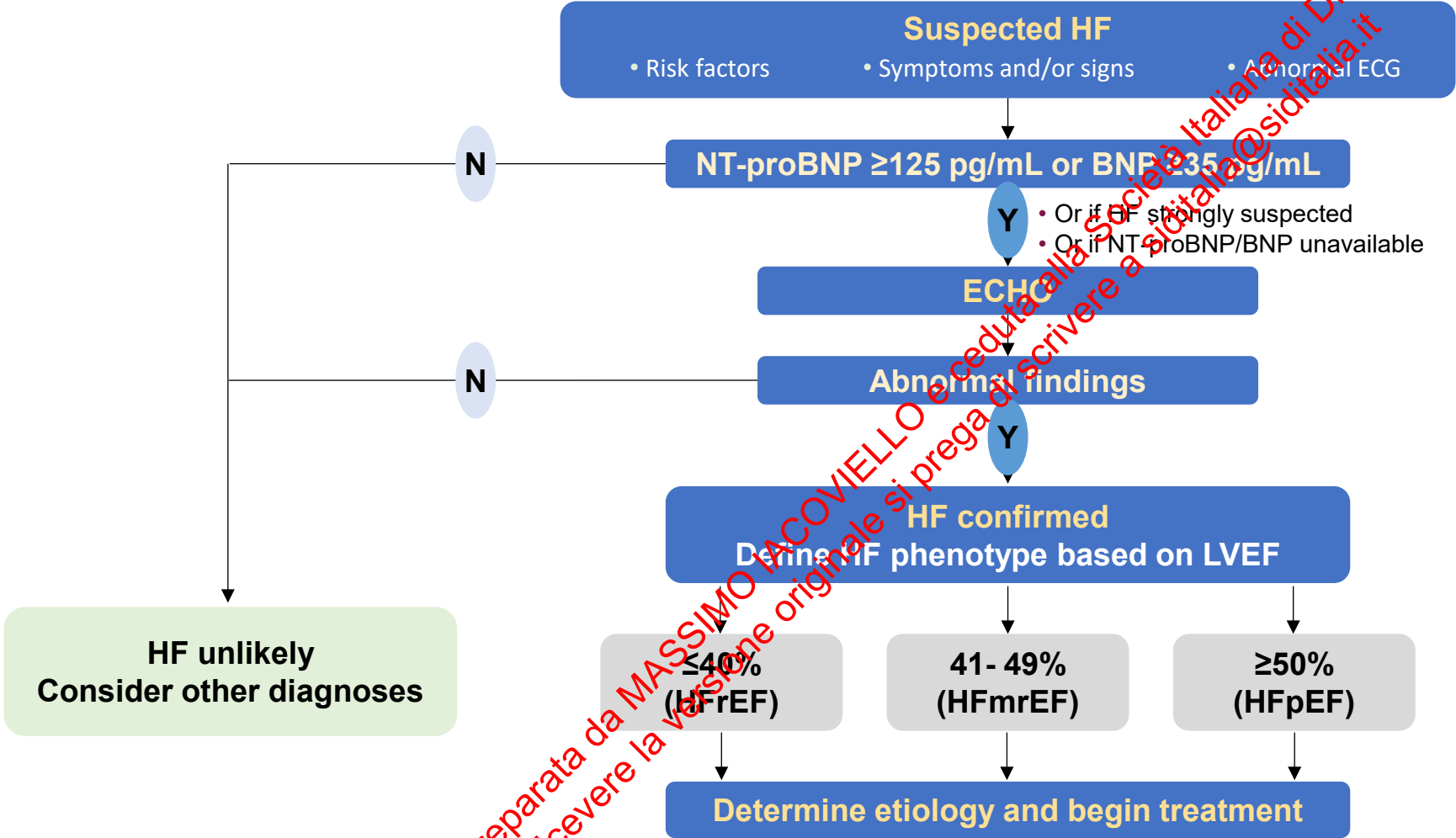
Zeeland Province of Holand
605 patients with T2DM
(24 known HF)
27.7% with unknown HF

Boonman-de Winter et al.
Diabetologia (2012) 55:2154–2162

Characteristic	All patients (n=581)	Newly detected heart failure (n=81)	No heart failure (n=420)	p value
Mean (SD) age (years) ^a	71.6 (7.4)	74.5 (7.7)	70.5 (6.9)	<0.001
Male	310 (53.4)	77 (47.8)	233 (55.5)	0.098
Median (IQR) duration of diabetes ^a	5.5 (3.0, 15.2)	6.3 (3.0, 10.2)	5.1 (3.0, 10.1)	0.292
Mean (SD) HbA _{1c} (%)	6.7 (0.7)	6.7 (0.7)	6.7 (0.7)	0.519
Mean (SD) HbA _{1c} (mmol/mol)	49.5 (8.0)	49.9 (8.2)	49.4 (7.4)	0.519
Current smoker	80 (13.8)	24 (14.9)	56 (13.3)	0.622
Mean (SD) BMI (kg/m ²)	28.1 (5.1)	29.7 (6.0)	27.6 (4.5)	<0.001
BMI >30 kg/m ²	163 (28.1)	63 (39.1)	100 (23.8)	<0.001
Comorbidities ^b				
Ischaemic heart disease ^c	118 (18.9)	50 (31.1)	58 (13.8)	<0.001
Atrial fibrillation	42 (6.2)	20 (12.4)	22 (5.2)	0.003
Stroke/TIA	35 (9.5)	23 (14.3)	32 (7.6)	0.014
Peripheral arterial disease	39 (6.7)	21 (13.0)	18 (4.3)	<0.001
Hypertension	381 (65.6)	119 (73.9)	262 (62.4)	0.009
Asthma/COPD	71 (12.2)	28 (17.4)	43 (10.2)	0.018
Renal dysfunction	26 (4.5)	11 (6.8)	15 (3.6)	0.089
Thyroid disease	43 (7.4)	15 (9.3)	28 (6.7)	0.275
Medication				
Loop diuretics	36 (6.2)	22 (13.7)	14 (3.3)	<0.001
Thiazide diuretics	167 (28.7)	51 (31.7)	116 (27.6)	0.333
Additional tests				
Abnormal ECG ^d	342 (58.9)	128 (79.5)	214 (51.0)	<0.001
NT-proBNP >125 pmol/l (125 pg/ml)	183 (31.5)	87 (54.0)	96 (22.9)	<0.001
Median (IQR) NT-proBNP	9.0 (5, 18)	16.0 (9, 41)	8 (5, 14)	<0.001
Echocardiographic variables				
Mean (SD) LVEF	60.2 (8.2)	56.9 (9.4)	61.4 (7.4)	<0.001
LVEF >55%	438 (75.4)	107 (66.5)	331 (78.8)	0.002
LVEF 45–55%	117 (20.1)	34 (21.1)	83 (19.8)	0.430
LVEF ≤45%	26 (4.5)	20 (12.4)	6 (1.4)	<0.001

Diapositiva preparata da MASSIMO IACOVELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it

ESC DIAGNOSTIC ALGORITHM FOR HF

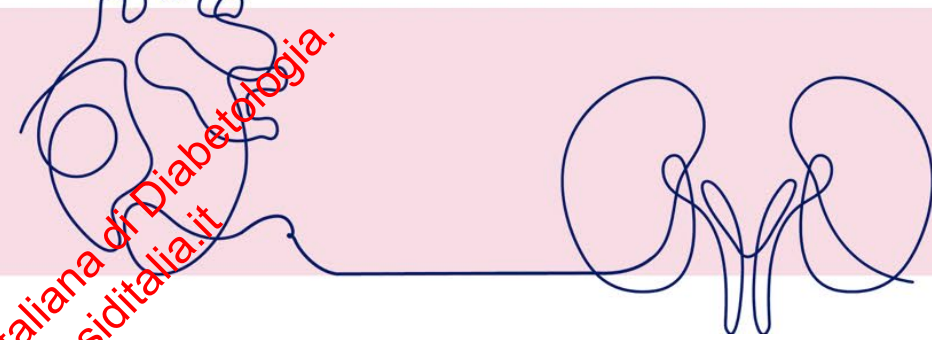


BNP = B-type natriuretic peptide; ECG = electrocardiogram; ECHO = echocardiography; ESC = European Society of Cardiology; HF = heart failure; HFmrEF = heart failure with mildly reduced ejection fraction; HFpEF = heart failure with preserved ejection fraction; HFrEF = heart failure with reduced ejection fraction; LVEF = left ventricular ejection fraction; NT-proBNP = N-terminal pro-B-type natriuretic peptide.

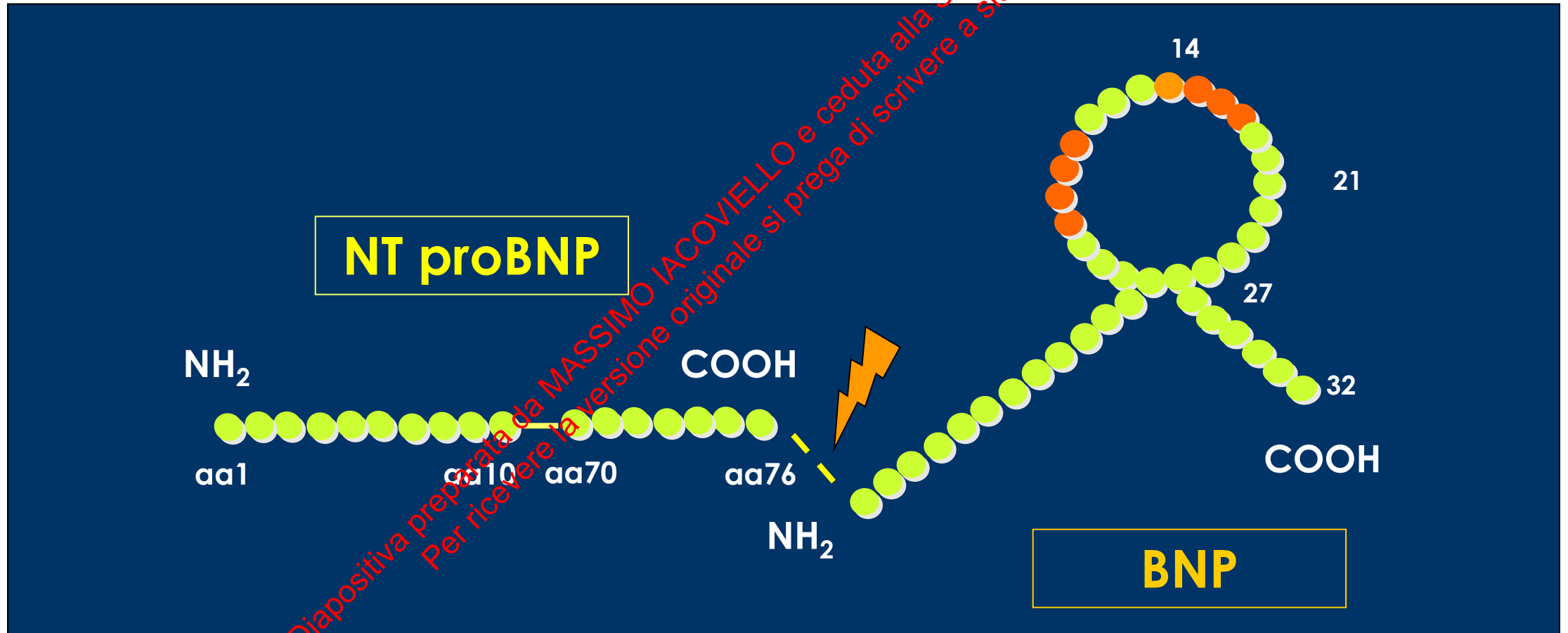
McDonagh TA et al. *Eur Heart J* 2021;42:3599-3726.

	EPICA study [7]				Diagnosi differenziale
	Sensibilità	Specificità	PPP	PPN	
Dispnea da sforzo	79	84	19	99	Broncopneumopatia cronica ostruttiva, Asma, altre patologie polmonari, pleutiche e della gabbia toracica, Anemia, Obesità, Decondizionamento muscolare
Dispnea a riposo	11	99	48	96	Sindrome da distress respiratorio, patologie infiammatorie/infettive broncopulmonari
Ortopnea	25	99	64	97	Broncopneumopatie, Asma, Edema polmonare da tossici, Obesità
Dispnea parossistica notturna	29	98	40	97	Broncopneumopatie, apnee notturne
Tosse	46	85	12	97	Broncopneumopatie croniche, Anemia, uso di ACE-inibitore
Tachicardia (>110)	23	94	16	96	Aritmie, Tachicardia sinusale inappropriata, Anemia, Febbre, Ipovolemia, Tireotossicosi, Feocromocitoma, Farmaci
III tono	3	99	58	96	Stati di alta gittata (anemia, gravidanza, shunt artero-venosi, tireotossicosi) o sovraccarico di volume (valvulopatie, insufficienza renale)
Rumori umidi polmonari	37	97	36	97	Polmoniti, sindrome da distress respiratorio
Turgore giugulari	49	99	47	97	Se bilaterale: valvulopatia tricuspidalica, sindrome vena cava superiore. Se monolaterale, patologie compressive o ostruttive (es tumori, trombosi ecc.)
Edemi declivi	56	89	18	98	Insufficienza venosa, insufficienza renale acuta, sindrome nefrosica
Reflusso epato-giugulare	26	99	48	97	Valvulopatia tricuspidalica, Ipertensione polmonare
Epatomegalia	17	97	20	96	Epatopatie

Diapositiva preparata da MASSIMO IACOVIELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siiditalia@siiditalia.it



I peptidi natriuretici



Il circolo vizioso della disfunzione ventricolare nel diabete mellito

M. Iacoviello

Screening for
Heart Stress
in Asymptomatic patients with T2D
(or other risk factors for CVD)



NT-proBNP

Rule-out
≤ 50pg/mL

Grey zone

**Age-adjusted
Rule-in**

<50y: ≥ 75pg/mL
50-74y: ≥ 150pg/mL
≥75y: ≥ 300pg/mL

**Heart Stress
Very Unlikely**

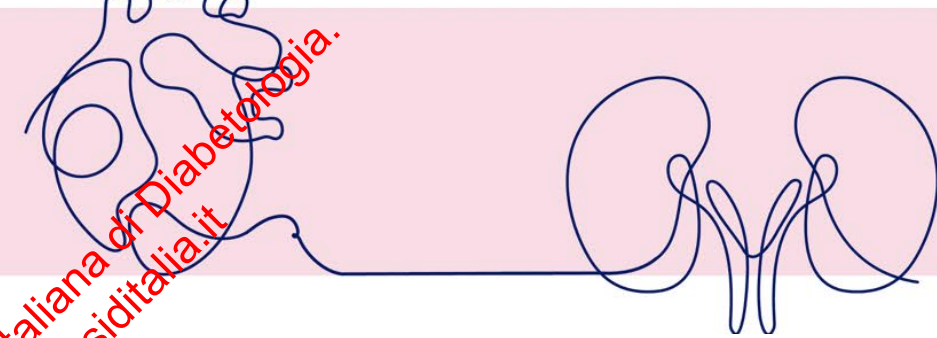
Repeat NT-proBNP
in one year

**Heart Stress
Not Likely**

Repeat NT-proBNP in 6
months

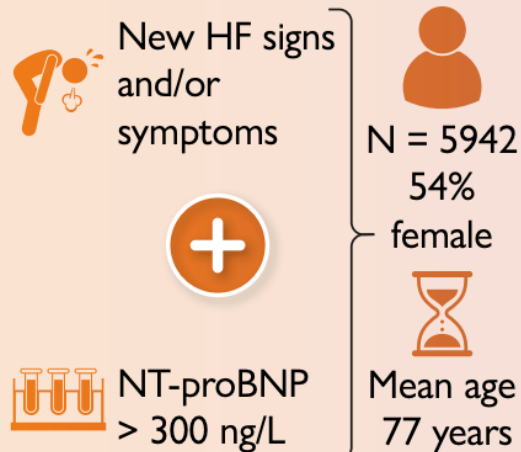
**Heart Stress
Likely**

Arrange Echocardiography
Assessment by Heart Failure
team if cardiac dysfunction
present



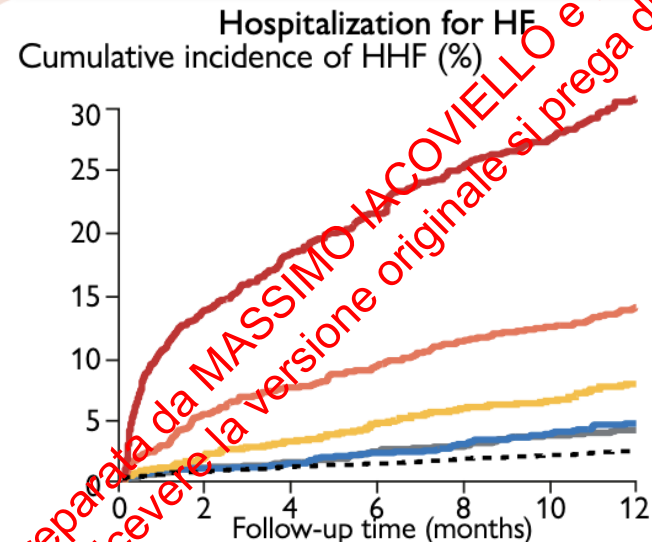
Natriuretic peptides and early HF diagnosis

Patients with *de novo*
suspected HF in structured
outpatient care with:

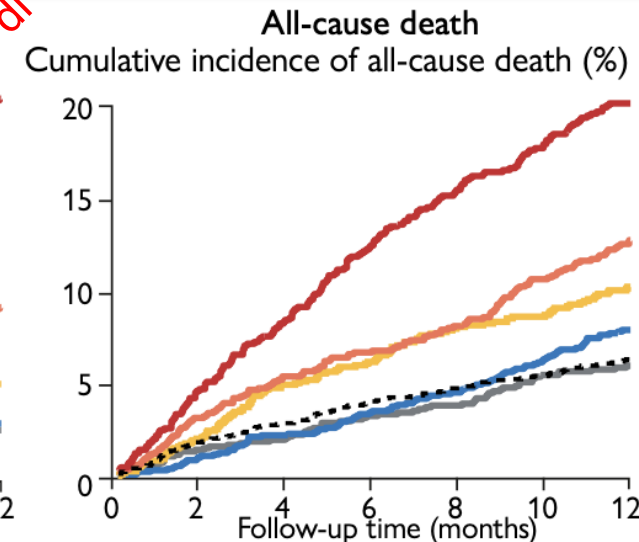


1-year follow-up findings

Risks



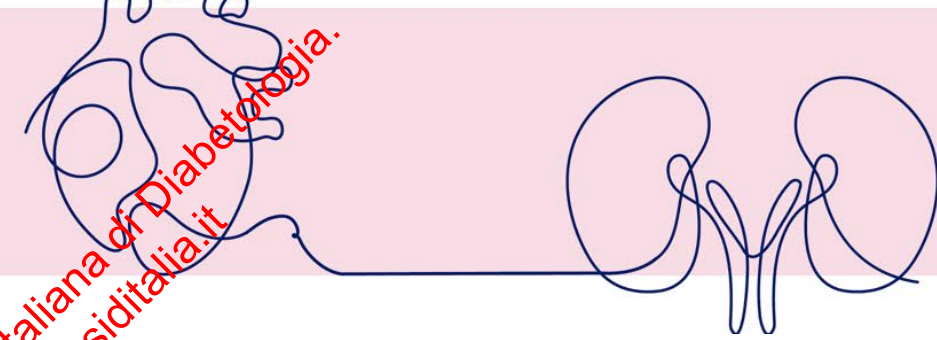
Suspected *de novo* HF: 12.5 events/100 PY
Matched controls: 2.2 events/100 PY



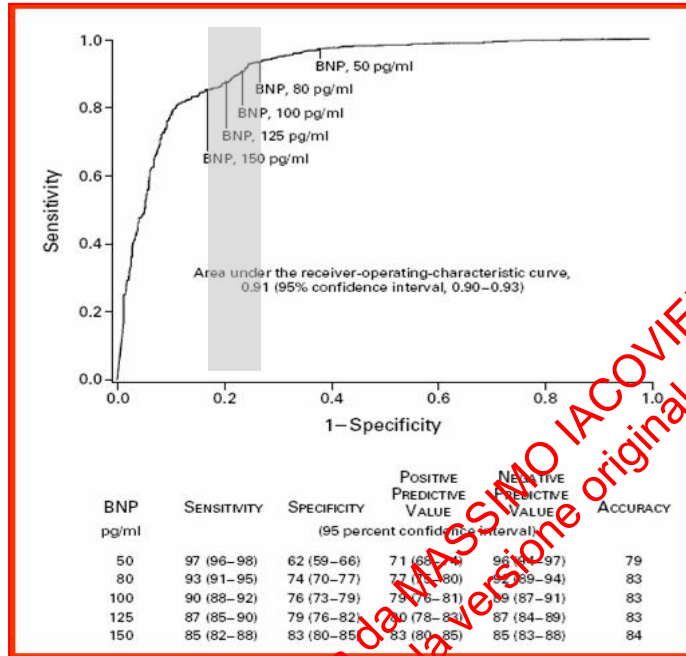
Suspected *de novo* HF: 11.7 events/100 PY
Matched controls: 6.5 events/100 PY

Il circolo vizioso della disfunzione ventricolare nel diabete mellito

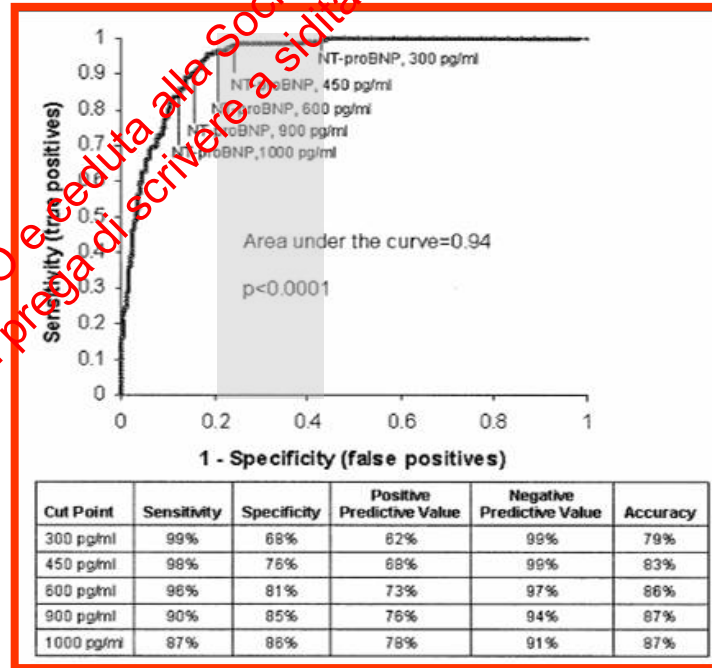
M. Iacoviello



BNP



NT-proBNP



NT-proBNP ≥ 125 pg/mL
or BNP ≥ 35 pg/mL



or if HF strongly suspected
or if NT-proBNP/BNP unavailable

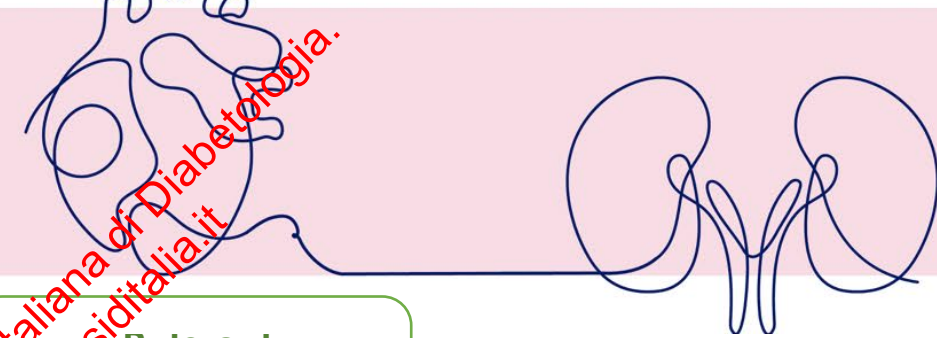
Echocardiography

BNP ≥ 100 pg/mL
NT-proBNP ≥ 300 pg/mL^c
MR-proANP ≥ 120 pg/mL

Acute heart failure confirmed

Annuzzi JL Am J Cardiol 2005;95:948

- Alta predittività negativa
- Bassa specificità



Peptidi natriuretici

Modif. da Bayes-Genis et al.
Eur J Heart Fai;2023;25;1891–1898

Correzione

eGFR (ml/min/1.73m²):

- <30 ⇒ ↑the cut-point by 35%;
- 45-60 ⇒ ↑the cut-point by 25%;

BMI (Kg/m²):

- 30-35 ⇒ ↓the cut-point by 25%;
- 35-40 ⇒ ↓the cut-point by 30%;
- >40 ⇒ ↓the cut-point by 40%;

Fibrillazione atriale:

- <90 bpm ⇒ ↑the cut-point by 50%;
- >90 bpm ⇒ ↑the cut-point by 100%;

■ ➡ **NT-proBNP**

**Paziente
ambulatoriale**
(sospetto scompenso
cardiaco per sintomi
esame obiettivo ECG)

Rule-out

<125 pg/mL

**Cardiaco
Molto
Improbabile**

Grey zone

50-74 y: 125-250 pg/mL

>75 y: 125-500 pg/mL

**Scompenso
Cardiaco
Molto
Improbabile**

Rule-in in base età

<50 y: ≥250 pg/mL

50-74 y: ≥250 pg/mL

>75 y: ≥500 pg/mL

**Scompenso
cardiaco
probabile**

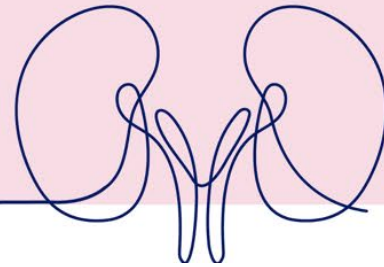
**Rule-in
Alto rischio**

>2000 pg/mL

**Scompenso
cardiaco molto
probabile**

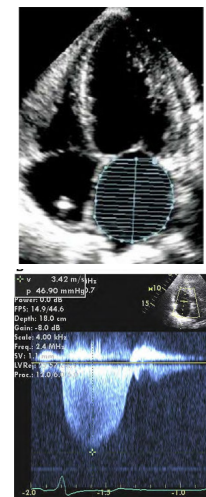
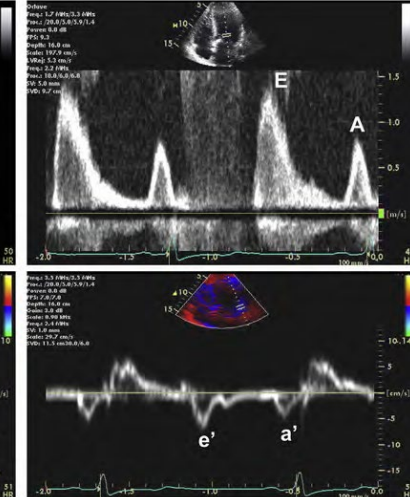
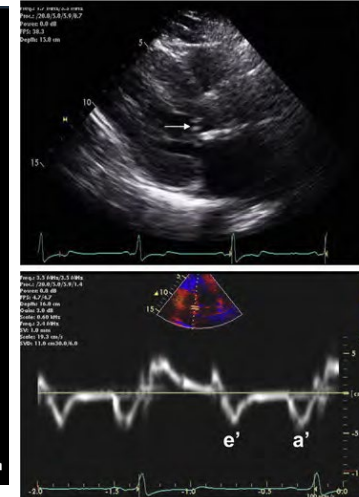
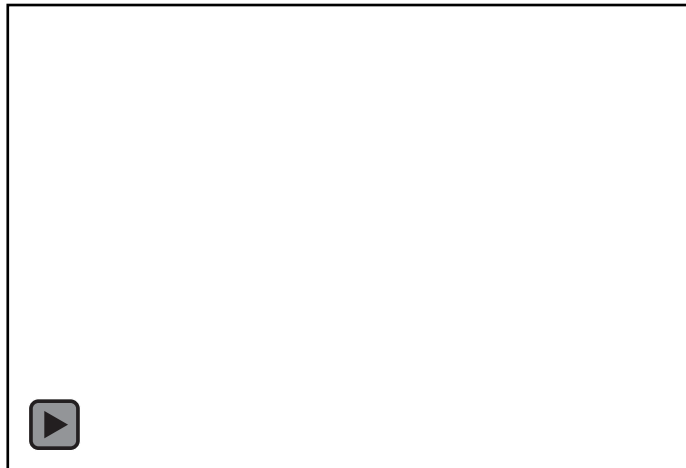
Il circolo vizioso della disfunzione ventricolare nel diabete mellito

M. Iacoviello



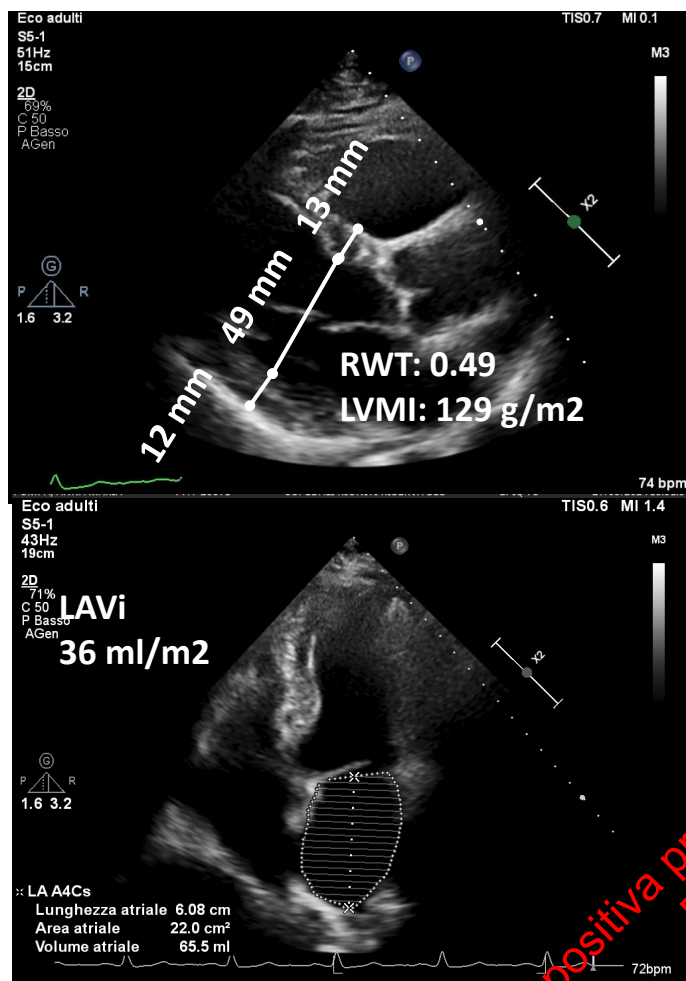
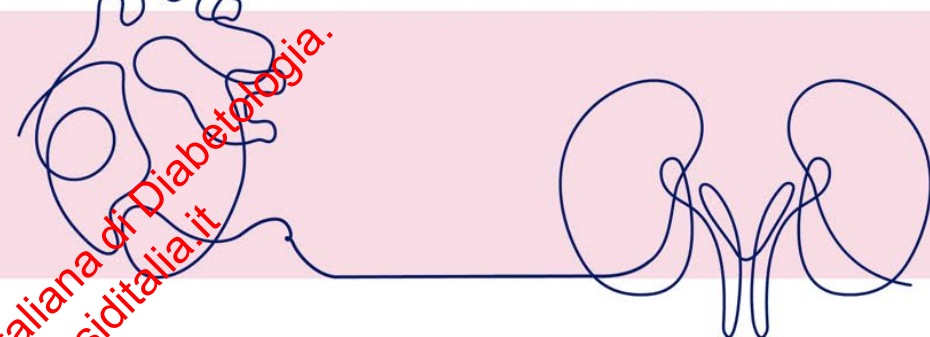
Type of HF		HFrEF	HFmrEF	HFpEF
CRITERIA	1	Symptoms ± Signs ^a	Symptoms ± Signs ^a	Symptoms ± Signs ^a
	2	LVEF ≤40%	LVEF 41 – 49% ^b	LVEF ≥50%
	3	—	—	Objective evidence of cardiac structural and/or functional abnormalities consistent with the presence of LV diastolic dysfunction/raised LV filling pressures including raised natriuretic peptides ^c

© ESC 2021



Diapositiva preparata da MASSIMO IACOVIELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it

- Massa ventricolare sinistra aumentata;
- Alterate velocità diastoliche (rapporto E/A, e', rapporto E/e');)
- Aumentato volume atriale;
- Aumentate pressioni destre



Parametro

- Spessore del setto interventricolare (mm):
- Diametro telediastolico (mm):
- Spessore della parete posteriore (mm):

Range normalità

M

F

6-10	6-9
42-58	38-52
6-10	6-9
≤ 115 (102)	≤ 95 (88)
< 0.42	< 0.42
> 34	> 34

- Massa ventricolare sinistra calcolata (g/m2)*:
- Spessore parietale relativo*:
- Volume atriale sinistro indicizzato (ml/m²):

*LV mass = $0.8 \times (1.04 \times [(\text{spessore setto interventricolare} + \text{diametro telediastolico} + \text{spessore parete posteriore})^3 - \text{diametro telediastolico}^3] + 0.6 \text{ grammi}$;
RWT: $2 \times \text{spessore parete posteriore} / \text{diametro telediastolico}$

Diagnosi precoce e
trattamento efficace
della patologia

**CARDIONEFR
METABOLICA**



Il circolo vizioso della disfunzione ventricolare nel diabete mellito

M. Iacoviello

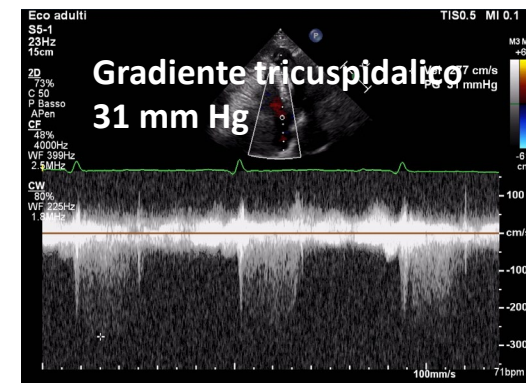
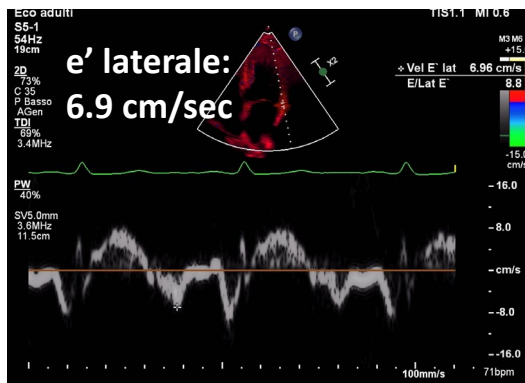
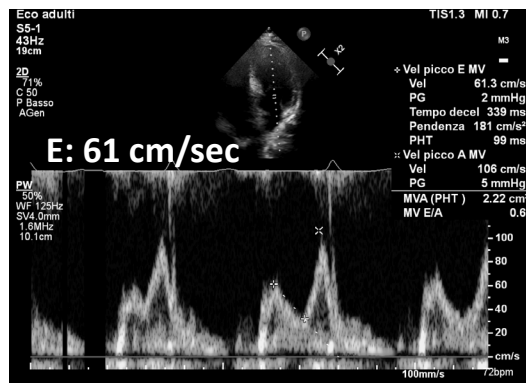
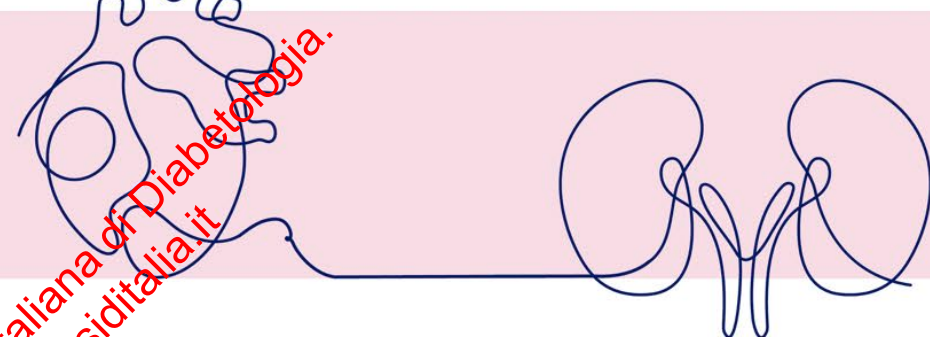
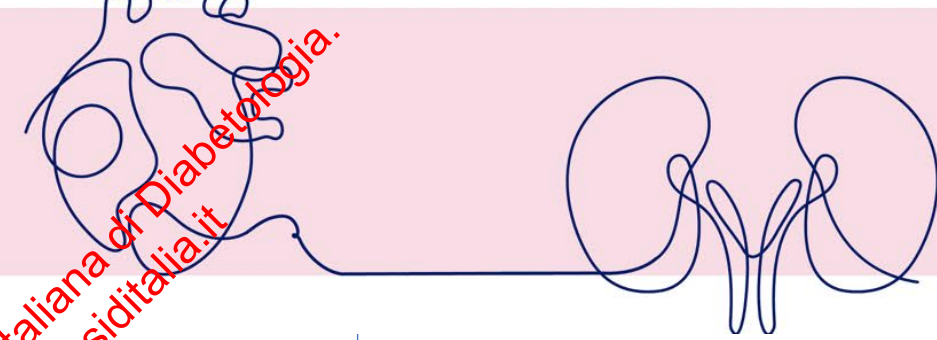


Table 4 LV relaxation, filling pressures and 2D and Doppler findings according to LV diastolic function

	Normal	Grade I	Grade II	Grade III
LV relaxation	Normal	Impaired	Impaired	Impaired
LAP	Normal	Low or normal	Elevated	Elevated
Mitral E/A ratio	≥ 0.8	≤ 0.8	>0.8 to <2	>2
Average E/e' ratio	<10	<10	10–14	>14
Peak TR velocity (m/sec)	<2.8	<2.8	>2.8	>2.8
LA volume index	Normal	Normal or increased	Increased	Increased

Misure Doppler

Diapositiva preparata da MASSIMO IACOVELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it

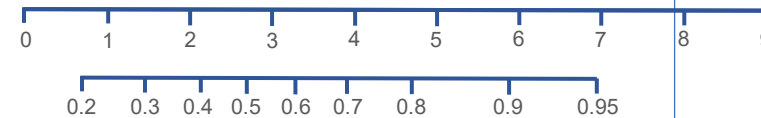


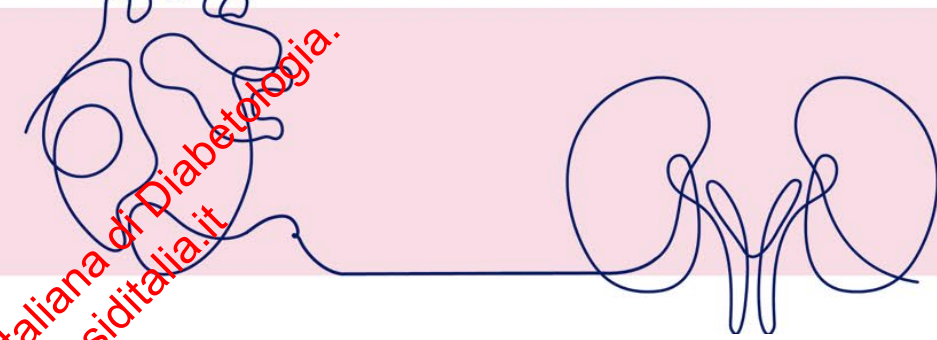
H2PEF score

	Clinical variable	Values	Points
H₂	H heavy	Body mass index >30 kg/m ²	2
	H ypertensive	≥2 antihypertensive medicines	1
F	Atrial F ibrillation	Paroxysmal or persistent	3
P	P ulmonary hypertension	Doppler echocardiogram estimated pulmonary artery systolic pressure >35 mmHg	1
E	E lder	Age >60 years	1
F	F illing pressure	Doppler echocardiographic E/e' >9	1
H₂FPEF score			Sum (0–9)

Total points

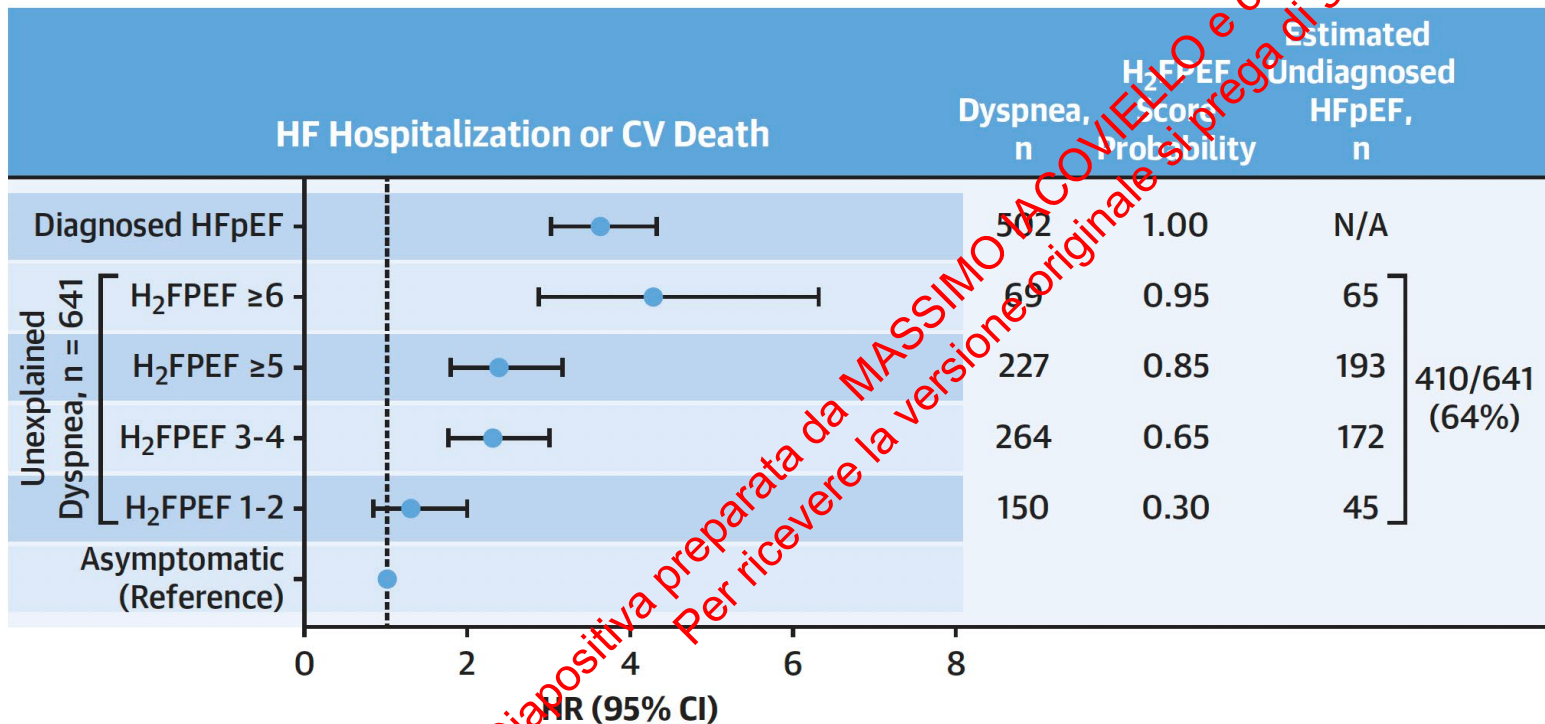
Probability of HFpEF





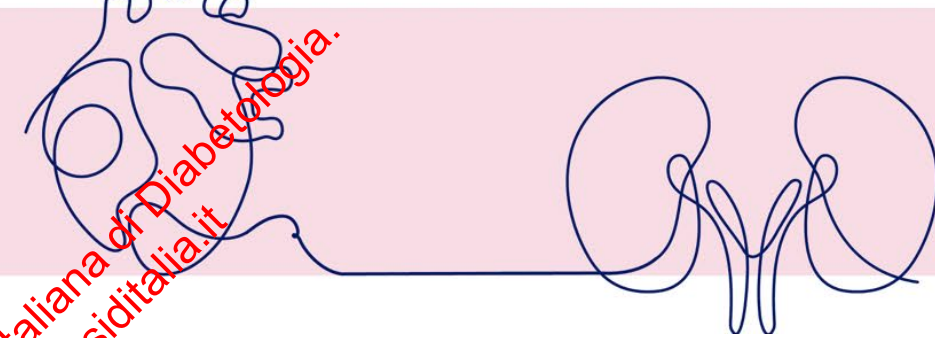
Missed diagnosis in HFpEF: ARIC study

Among 4,892 community-dwelling older adults participating in the ARIC study, 76.6% had no dyspnea, 10.3% had been diagnosed with HFpEF, and 13.1% had moderate or greater dyspnea, but no diagnosis of HFpEF.



Among patients with
unexplained dyspnea,
35% had high-risk on the basis
of H₂FPEF scores.

35%

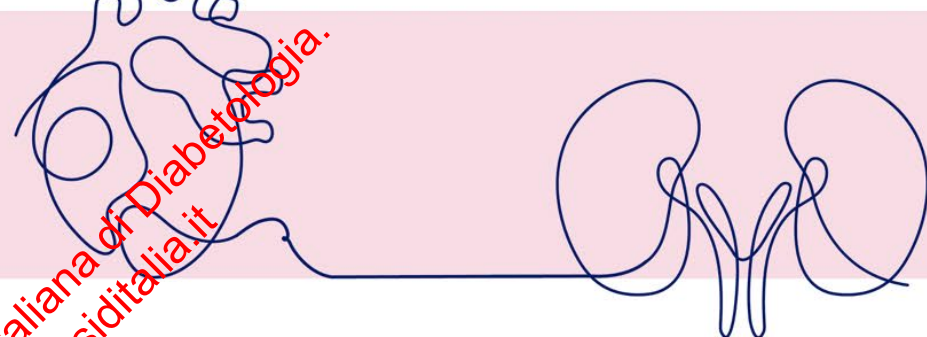


Conclusioni

- Nel paziente con diabete mellito molteplici meccanismi fisiopatologici sono responsabili di una disfunzione sistolica e diastolica ventricolare capace di provocare l'insorgenza di scompenso cardiaco
- Tali condizioni sono accentuate dalla presenza di malattia renale cronica ed obesità. Quest'ultima si associa frequentemente alla insorgenza di uno scompenso cardiaco a frazione d'eiezione preservata
- Una accurata valutazione della funzione cardiaca nei pazienti diabetici è essenziale per una diagnosi precoce ed un trattamento tempestivo

Diagnosi precoce e
trattamento efficace
della patologia

**CARDIONEFRO
METABOLICA**



Diapositiva preparata da MASSIMO IACOVIELLO e ceduta alla Società Italiana di Diabetologia.
Per ricevere la versione originale si prega di scrivere a siditalia@siditalia.it